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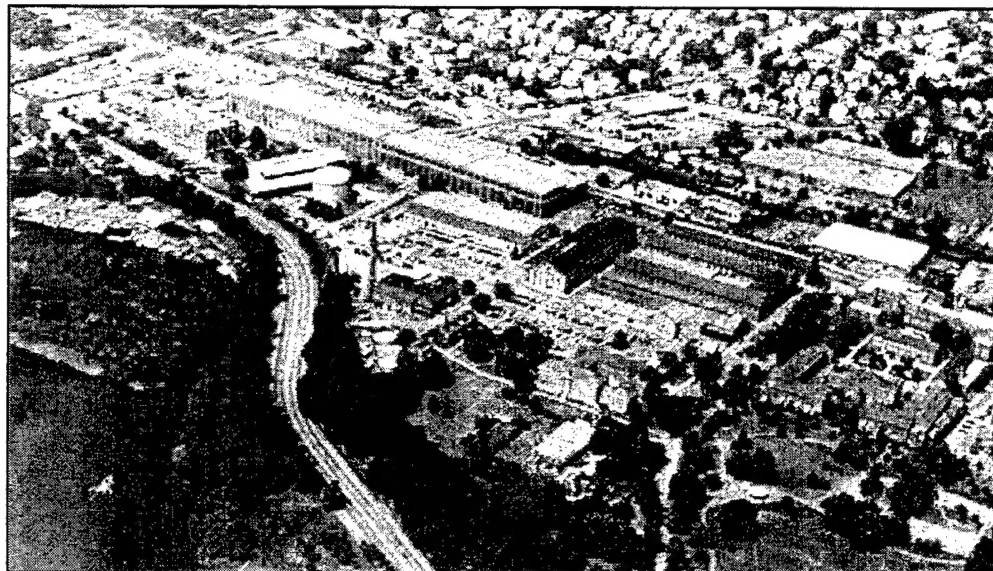
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Technical Review of the Economic Development Conveyance Application for the Army Materials Technology Laboratory, Watertown, MA

by

Jeffrey J. Bogg, Samuel L. Hunter, Jane E. DeRose, Don Kermath, Richard L. Schneider, Alex D. Zylbergait, Aaron A. Freeman, Nicholas Karavolos, and David T. McKay



In 1993 President Clinton requested that Congress provide new authority to expedite the reuse of military bases adversely affected by Base Realignment and Closure (BRAC) actions. The result was a new property transfer method, called an Economic Development Conveyance (EDC), which gives greater flexibility to the Department of Defense (DoD) and affected communities to negotiate a mutually beneficial property transfer.

On 5 March 1997, the Watertown Arsenal Development Committee filed an EDC application for transfer of the Army Materials Technology Laboratory, a U.S. Army facility closed in 1988 under BRAC. The U.S. Army Construction Engineering Research Laboratories was tasked by Headquarters, U.S. Army Corps of Engineers to (1) review the EDC application for compliance with DoD rules implementing the Federal EDC policy, (2) analyze the findings, and (3) report to the sponsor.

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In 1993 President Clinton requested that Congress provide new authority to expedite the reuse of military bases adversely affected by Base Realignment and Closure (BRAC) actions. The result was a new property transfer method, called an Economic Development Conveyance (EDC), which gives greater flexibility to the Department of Defense (DoD) and affected communities to negotiate a mutually beneficial property transfer.

On 5 March 1997, the Watertown Arsenal Development Committee filed an EDC application for transfer of the Army Materials Technology Laboratory, a U.S. Army facility closed in 1988 under BRAC. The U.S. Army Construction Engineering Research Laboratories was tasked by Headquarters, U.S. Army Corps of Engineers to (1) review the EDC application for compliance with DoD rules implementing the Federal EDC policy, (2) analyze the findings, and (3) report to the sponsor.

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Executive Summary

The following paragraphs summarize the findings of the USACERL technical group tasked to evaluate an Economic Development Conveyance (EDC) application for the Army Materials Technology Laboratory (ATML) in Watertown, MA. The applicant, or Local Redevelopment Authority (LRA), is the Watertown Arsenal Development Corporation (WADC). Each section below addresses evaluative criteria specified by the 32 CFR Part 91.7(e)(7), which governs EDCs of closed military properties.

Adverse Economic Impact on the Region and Potential Recovery (Chapter 1)

Economic analysis of the AMTL closure and proposed redevelopment indicates that the closure caused measurable adverse impacts and that these impacts will probably be fully mitigated by the proposed AMTL redevelopment. Since the Final Environmental Impact Statement (FEIS) did not quantify either closure or potential redevelopment impacts, USACERL relied on the Regional Input-Output Modeling System (RIMS II) to examine potential economic effects.

Closure analysis with RIMS II indicates that the employment losses and reduction in exogenous cash inflows associated with the AMTL closure probably had measurably significant local impacts. However, the effective magnitude of these impacts was somewhat mitigated by Watertown's extensive linkages to the Greater Boston regional economy, which is the fourth largest economy on the East Coast.

Redevelopment analysis with RIMS II suggests that the proposed AMTL reuse will completely mitigate closure impacts. Although analysis was limited by a lack of data, RIMS II economic projections indicate that, even with conservative estimates, the AMTL redevelopment will probably create at least two jobs for every one lost because of the closure, and will replace each lost dollar from the regional economy with up to three new dollars.

Extent of Short- and Long-Term Job Creation (Chapter 2)

The proposed AMTL reuse will probably create about 1,150 short-term jobs and between 3,800 to 5,100 long-term direct and indirect jobs under full redevelopment. Regional economic analysis suggests that each permanent on-site job created at the redeveloped AMTL facility will support about 2.2 additional indirect jobs in the surrounding region. The USACERL engineering analysis and estimates in the reuse plan indicate that about 1,200 to 1,600 permanent on-site jobs will be created, which suggests that between 3,800 to 5,100 total jobs will be created at full redevelopment.

It must be noted, however, that this indirect long-term job creation forecast is subject to several caveats. First, limitations in the selection of the regional boundaries for the economic analysis may have excluded important intraregional activities, which would cause the economic model to incorrectly aggregate the effects of intraregional business relocations, which actually cause no positive economic impact. This incorrect aggregation would cause the indirect long-term job multiplier to be overstated. Second, because projections of the gross revenue of tenants were unavailable at the time of this writing, USACERL relied on employment-based economic forecasting procedures that are inherently less accurate than other methods. Both of these factors may have limited the accuracy of the indirect long-term job creation multiplier, resulting in an actual impact of less than 2.2 indirect jobs created for each on-site job.

Consistency of the EDC Application With the Overall Redevelopment Plan (Chapter 3)

The AMTL EDC application is generally consistent with the Watertown Arsenal Reuse Plan. In particular, the EDC application soundly responds to the economic redevelopment and historic preservation objectives of the reuse plan by proposing actions that appear well suited to the achievement of these goals. However, it must also be noted that the EDC application was somewhat limited in that it did not include sufficient original data or supporting documentation to enable USACERL to replicate or validate its business plan conclusions. USACERL was able to overcome this limitation through the development of an independent financial analysis.

Market and Financial Feasibility of the Redevelopment Business Plan (Chapter 4)

The WADC requests conveyance of the subject EDC parcel (30 acres of land and 637,741 sq ft of building improvements) at no cost (i.e., 100 percent discount). The applicant's reuse plan is based on reusing eight buildings for office, R&D, and light industrial uses. Also included is the construction of two parking garages, demolition of selected buildings, and on- and off-site infrastructure improvements. Key components and assumptions of the plan include the following:

- the entire EDC parcel is to be developed and leased to full occupancy within 6 years, starting in 1998.
- \$8.35 million in eventual building sales revenue over 6 years
- \$1.9 million in ongoing operations and maintenance costs over 6 years
- structured parking costs of \$9 million
- total capital improvements of \$14.8 million
- \$8.45 million in fiscal packaging to mitigate annual operational shortfalls
- a 6 percent discount rate.

Based on the above business plan assumptions, the WADC calculates that the net present value (NPV) of the pro forma is \$0, thus resulting in a zero-cost request. However, USACERL independently calculated an NPV range of \$371,933 to \$581,137 at 6 and 11 percent discount rates. To supplement the WADC's analysis, USACERL developed two alternative project views based on USACERL analysis which follow:

1. WADC's project view with USACERL-developed structured parking costs of \$8 million versus the WADC's \$9 million estimate (1997 dollars)
2. WADC's project view with reduced parking requirements totaling \$6.7 million as a function of the Massachusetts Department of Environmental Protection (MDEP) mitigation mandates.

Applying discount rates of 11 and 6 percent to annual income streams, the calculated NPV ranges for each perspective above, respectively, were:

1. *Positive* \$1.3 million to *positive* \$1.2 million (positive NPV, considering reduced parking structure costs)

2. *Positive* \$2.0 million to *positive* \$2.4 million (positive NPV, considering reduced structured parking requirements).

To test the reasonableness and sensitivity of the WADC's assumptions, USACERL independently developed four alternative project views, which include:

1. Project analysis assuming 100-percent surface parking and reduced building sales as developed by WADC in the 1997 Reuse Plan
2. Project analysis assuming structured parking with a 50/50 cost share between WADC and private sector developers to reduce the WADC's financial risk exposure
3. Project analysis assuming delayed building sales resulting from ongoing site environmental encumbrances
4. Project analysis using USACERL-developed building values derived from USACERL's independent real estate market analysis and building fit-up cost estimates.

The discounted cash flow for Scenario 1 yielded in the following NPV ranges for three analytic perspectives at 11 and 6 percent discount rates:

1. *Positive* \$4.1 million to *positive* \$4.4 (positive NPV, considering 100% surface parking)
2. *Positive* \$7.4 million to *positive* \$8.2 million (positive NPV, 100% surface parking and USACERL developed building sales)
3. *Positive* \$6.7 million to \$7.7 million (positive NPV, 100% surface parking with USACERL building values environmentally encumbered)

The discounted cash flow for Scenario 2 yielded in the following NPV ranges for three analytic perspectives at 11 and 6 percent discount rates:

1. *Positive* \$974,166 to *positive* \$724,285 (positive NPV, structured parking cost sharing)
2. *Positive* \$2.2 million to *positive* \$2.3 million (positive NPV, structured parking cost sharing with USACERL building sales)

3. *Positive* \$1.8 million to *positive* \$2.0 million (positive NPV, with environmental encumbrances).

The discounted cash flow for Scenario 3 yielded in the following NPV ranges for three analytic perspectives at 11 and 6 percent discount rates:

1. *Negative* \$18,551 to *negative* \$22,285 (negative NPV, environmentally encumbered scenario with WADC business plan assumptions)
2. *Positive* \$719,976 to *positive* \$853,060 (positive NPV, environmentally encumbered scenario with reduced structured parking costs)
3. *Positive* \$1.4 million to *positive* \$1.9 million (positive NPV, environmentally encumbered scenario with reduced parking requirements).

Finally, the discounted cash flow for Scenario 4 produced the following NPV ranges for three analytic perspectives at 11 and 6 percent discount rates:

1. *Positive* \$3.2 million to *positive* \$3.3 million (positive NPV, USACERL building values with WADC total capital costs)
2. *Positive* \$4.0 million to *positive* \$4.2 million (positive NPV, USACERL building values with reduced parking structure costs)
3. *Positive* \$4.7 million to *positive* \$5.3 million (positive NPV, USACERL building values with reduced parking requirements).

USACERL concludes that the WADC's proposed business plan is financially feasible, and is further enhanced through USACERL scenario development. This conclusion is supported by USACERL's estimated range of project NPV for the business plan of *positive* \$3.3 to \$5.4 million. The lower range estimate reflects the WADC's full infrastructure investment program, while the higher estimate incorporates USACERL's reduced parking structure requirements and building value scenarios.

Need and Extent of Infrastructure Improvements (Chapter 5)

WADC estimates that about \$14.1 million will need to be invested in various infrastructure improvements in order to place the AMTL facility in salable condition. Under USACERL's preferred scenario, the minimum cost to improve

the infrastructure should range between \$13.4 and \$15.5 million. Thus, USACERL finds that the total dollar amounts proposed by WADC are reasonable.

Note, however, that the cost of each particular WADC line item does not necessarily fall within USACERL's developed range of reasonableness. The reason for this discrepancy is two-fold. First, the WADC estimates include the costs associated with the construction of two structured parking facilities, which cumulatively represent about 70 percent of the total capital costs associated with the AMTL redevelopment. However, analysis by USACERL indicates that two structured parking facilities are unnecessary and would violate the mandates of the Environmental Notification Form (ENF) and the Final Environmental Impact Statement (FEIS). Limiting parking structure improvements to only one structure, as proposed by USACERL's scenarios, would reduce total capital costs to between \$7.1 and \$10 million. Second, in calculations of building demolition costs, USACERL included the interiors of Buildings 36, 39, and 60, which were programmed in the EDC application, as well as 37 shed, 97 shed, and Building 313C, which was contained in the Reuse Plan (Figure 1). Although the costs of demolishing these buildings were not included in the cost analysis performed by WADC, they were included in USACERL's preferred scenario, because it appears likely that these buildings will need to be demolished if WADC's proposed site configuration is to be implemented. Including these demolition costs in the cost estimates would increase the total costs by a minimum of \$1.96 to \$2.8 million and would essentially negate the cost benefits gained by reducing structured parking improvements. Therefore, while WADC's total dollar cost of infrastructure improvements falls with the range of reasonable values found by USACERL, the approach used to calculate these costs was markedly dissimilar. The financial effect of each of USACERL's alternative scenarios is considered at length in Chapter 4, **Market and Financial Feasibility of the Redevelopment Business Plan**.

Finally, WADC estimates of developable square feet and building fit-up costs, while not well-supported by referenced documents, were generally confirmed by USACERL's independent analysis.

Extent of State and Local Investment and Risk (Chapter 6)

Because of WADC's redevelopment program with an estimated investment of \$16.8 million, including the construction of two parking garages (\$9 million), an apparent \$8.45 million gap is generated between redevelopment costs and building sales. However, WADC identifies several sources of grant and debt financing that will cover yearly operational shortfalls and provide the necessary

capital infusion to begin development. Sources and levels of funding are as follows: (1) Economic Development Administration Grants - \$3,000,000, (2) Public Works and Economic Development Grant - \$2,000,000; (3) Community Development Action Grant - \$1,000,000, (4) Development Bonds Secured by Town Taxes - \$2,450,000, (5) Mass Development Line of Credit - \$144,000, and (6) a Mass Development Bridge Loan - \$250,000. Access to grant and debt financing greatly reduces WADC's overall financial risk exposure.

In terms of organization and management risk relative to the redevelopment effort, the Massachusetts Development Finance Agency has pledged both in-kind and financial support. Mass Development has been active in economic development projects across the Commonwealth, including Fort Devens, and possesses the necessary development expertise to foster project viability. Environmental risk may be an issue in terms of ongoing environmental remediation and possible permitting restrictions imposed by the Massachusetts Department of Environmental Protection in terms of on-site traffic and parking generation.

USACERL finds that WADC's proposed capital improvement program is reasonable and prudent within the context of job creation and economic development. However, WADC's purported requirement for 1,500 on-site parking spaces is most likely an overstatement in terms of cost and actual requirement based on USACERL's findings. Additionally, WADC's estimates of residual building values are unsupported and likely understated. In sum, WADC demonstrates financial feasibility and the capacity to redevelop AMTL as articulated in the Reuse Plan. However, the inclusion of USACERL findings increases project financial feasibility and reduces overall investment risk exposure to WADC.

Local and Regional Real Estate Market Conditions (Chapter 7)

Market analysis of the Watertown regional economy indicates that both the Watertown regional submarket, and the Greater Boston market as a whole, are currently experiencing extremely positive market conditions. AMTL itself is juxtaposed between several regional submarkets, including the Cambridge market, which is near central-suburban Boston, and the Route 128/Massachusetts Turnpike market, which includes the municipalities of Watertown, Newton, and other coterminous suburban areas (Figure 2). Both of these areas have thoroughly rebounded from the overbuilt recessionary market conditions present during the late 1980s. Although applicable rental rates have not yet matured to a level that will support speculative new construction, heated sales

and leasing activity in these areas have driven vacancy and absorption rates to 10-yr record levels.

Office market conditions are predicted to continue to strengthen over the coming months, as prominent real estate research firms continue to name Boston as a "best market" or the like. Vacancy rates are currently at a record-low level of 7 percent and are forecasted to drop further to 5 percent. Absorption rates have been similarly positive. Interest in new office construction activity is building, although current rental rates, and the lengthy Massachusetts permitting procedure, dictate that significant supply will not enter the market for at least 3 years.

Industrial market conditions are similarly strong and are re-experiencing mid-80s-era conditions. Vacancy rates have fallen from a 1994 high of about 21 percent to 12 percent and are forecasted to continue down and level off at about 9 percent, as new construction places fresh supply on the market. Absorption rates have also been positive, with interest particularly concentrated along the southern border of AMTL's Route 128 market. Interest in manufacturing and warehousing space has also been strong and has been driven by both a rebounding local economy and a new Massachusetts tax law that limits taxes on in-state manufacturing activity.

Boston area research and development demand has been more moderated than demand for office or industrial space, although it too has been recovering from the conditions present in the early 1990s. Current vacancy rates are in the 8 to 9 percent range and are forecasted to level off at a slightly lower level as rental rates increase. Absorption rates for 1997 and 1998 are projected to duplicate 1995 levels.

The Army's Disposal Plan, Other Federal Agency Concerns, and Other Property Disposal Authorities (Chapter 8)

As part of the EDC review process adopted by the BRAC office at HQUSACE and presented at the Corps of Engineers Real Estate Workshop in Denver, CO, in December 1995, USACERL has been asked to defer comment on these issues to the Real Estate Directorate at HQUSACE and the Corps of Engineers Division, New England. In addition, both the negotiation process leading up to the submittal of the formal EDC application and review of the legal environment related to real and personal property disposal are beyond the scope of USACERL's technical review.

Economic Benefit to the Federal Government (Chapter 9)

Without a timely conveyance of the EDC parcel, the Army would have to lay-away (mothball) and provide long-term operations, maintenance, and repair for the affected AMTL facilities and infrastructure. The one-time facility layaway costs as estimated by the Army are estimated to be \$2.2 million. Recurring operations, maintenance, and repair costs are estimated to be \$1.0 million.

While a timely conveyance would allow the Army to avoid these costs, based on the technical findings of Chapter 4, the applicant's overall proposed consideration to the Army (\$0) is inadequate for the following reasons:

- Although the applicant's \$14.8 million in proposed capital investment is uniquely and specifically attributable to the redevelopment of the EDC parcel, WADC's costs and requirements for structured parking are most likely overstated based on environmental impact restrictions and cost over-estimating. However, some discount from fair market value—but not 100 percent as requested by the applicant—may be appropriate to negotiate.
- WADC's estimates of residual building values are unsupported and underestimated based on USACERL's comprehensive market and building rehabilitation analysis.

When the above items are considered, the NPV for the applicant's business plan should amount to no less than \$3.3 million, and no more than \$5.3 million. Furthermore, based on the eligibility criteria reviewed in this report, it is the opinion of USACERL that the applicant is eligible for an EDC and public investment is needed for job creation. The Army's final determination of value and possible consideration from WADC will be contingent upon the results of the negotiation process and the Army's Fair Market Value appraisal results.

Review of the Application for Completeness (Chapter 10)

The submitted AMTL EDC application was complete. The application included a complete project narrative, an limited explanation of EDC contributions to short- and long-term job creation and economic redevelopment, a business and development plan, justification for use of the EDC process, and a statement of the LRA's legal authority to acquire and dispose of the property.

Foreword

This study was conducted for the Base Realignment and Closure (BRAC) Office, Headquarters, U.S. Army Corps of Engineers (HQUSACE), and funded through the BRAC Office, Office of the Assistant Chief of Staff for Installation Management (ACSIM-DAIM-BO) under Military Interdepartmental Purchase Request (MIPR) No. 7ACERB3001 dated 10 October 1997. The technical review monitor was Gary B. Paterson, CERE-C.

This work was performed by the U.S. Army Construction Engineering Research Laboratories (USACERL), Planning and Management Laboratory (PL), and Facilities Technology Laboratory (FL). Michael Golish is Operations Chief, PL, and Donald F. Fournier is Operations Chief, FL.

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COL James A. Walter is Commander of USACERL, and Dr. Michael J. O'Connor is Director.

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Introduction

Background

The Army Materials Technology Laboratory (AMTL) Economic Development Conveyance (EDC) parcel consists of 30 acres and 637,741 sq ft of building space in Watertown, MA, about 7 miles west of downtown Boston and directly adjacent to Cambridge. AMTL's main point of ingress/egress lies on Arsenal Street, which borders the facility on the North. Secondary access is maintained by North Beacon Street, which forms the southern border of the former arsenal. In terms of major transportation corridors, AMTL is situated near the Massachusetts Turnpike and Route 128 corridor. Occupying a low bluff overlooking the Charles River, the former Watertown Arsenal carries a rich history dating back to 1816. When AMTL was slated for closure by the 1988 Base Realignment and Closure (BRAC) Commission, the Town of Watertown stepped forward and established the Arsenal Reuse Committee and subsequent Watertown Arsenal Development Corporation (WADC) to facilitate the reuse and economic redevelopment of the surplus parcels. Since the 1988 announcement, the facility has demobilized in preparation for disposal. Figures 1 and 2 (pp 21 and 22) show maps of the AMTL site plan, the transportation network and regional area, and the local area, respectively.

On 2 July 1993, President Clinton announced a major new policy to speed the economic recovery of communities adversely affected by military base closures or realignments. The President requested that Congress provide additional authority to expedite the reuse of closing military bases, in an effort to create new jobs and reestablish the economic base. Congress provided this new authority (commonly called the "Pryor Amendments") and subsequent amendments as Title XXIX of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 1994. The Department of Defense (DoD) has recently codified the final implementing regulations for this legislation at 32 CFR 90-92, "Revitalizing Base Closure Communities." Collectively, these new rules are intended to facilitate the conveyance (transfer of military real and personal property) from the Federal government to an approved Local Redevelopment Authority (LRA).

These new regulations created a new property transfer authority called and Economic Development Conveyance, which gives greater flexibility to the military departments and affected communities to negotiate the terms and conditions of the conveyance if specified criteria are met. On 5 March 1997, the WADC, acting as the approved LRA, filed an EDC application with the Chief of the BRAC Office at Headquarters U.S. Army Corps of Engineers, for the conveyance of certain parcels on AMTL. Included as part of the EDC application was a copy of the Watertown Arsenal Reuse Plan.

In general, the WADC has requested that the Army transfer the EDC parcel under the following general terms and conditions:

1. The Army will negotiate a Master Lease/Purchase Agreement covering all 30 acres which comprise the EDC parcel, including land, buildings, utility systems, roads, and related infrastructure and personal property, by September 1997.
2. No direct monetary consideration will be provided for the EDC parcel.

The WADC EDC application provides discussion of the required elements under the regulation, but elements of the business plan as presented are unsupported by narrative discussion and appropriate references.

Subsequent to the receipt of the application by Headquarters, U.S. Army Corps of Engineers, the U.S. Army Construction Engineering Research Laboratories (USACERL, Champaign, IL) was tasked by headquarters to provide a technical review of the WADC application, evaluating it for compliance with 32 CFR Part 91 and related regulations. This report comprises USACERL's findings and conclusions.

Objective

The objective of this study was to technically evaluate WADC EDC application in terms of:

1. validity of the information provided by the WADC
2. completeness of the application according to the criteria and factors specified in the DoD regulations governing EDCs.

The objective of this report is to document the study's findings, noting any deficiencies found in the application, and to attempt to address those deficiencies.

Tasking and Approach

Technical review of WADC's EDC application was executed by a multidisciplinary work group formed and managed through the USACERL Planning and Management Laboratory (PL). In anticipation of the EDC application, the USACERL work group conducted site visits to AMTL and the Boston region on 11-12 February 1997. The purpose of the visit was to coordinate the application review with AMTL Army Caretaker Force personnel and to collect preliminary and follow-up data. Most of the group's analytical work and documentation occurred between 5 March and 9 May 1997.

Validity of the information provided on the EDC application was determined by following a protocol specifically developed to demonstrate how the substance of the application meets the criteria in the DoD implementing regulations related to EDCs. Using data provided in the EDC application and supporting documents, as well as data gathered independently by team members, USACERL evaluated the application according to the following criteria and factors.

1. adverse economic impact of closure on the region and potential for economic recovery after an EDC
2. extent of short- and long-term job generation
3. consistency with the overall Redevelopment Plan (i.e., the AMTL Reuse Plan)
4. financial feasibility of the proposed development, including market analysis, and the need and extent of proposed infrastructure improvements
5. extent of state and local investment and risk incurred
6. current local and regional real estate market conditions in the affected area
7. relationship to the overall Military Department disposal plan for the installation, incorporation of other Federal agency interests and concerns, and applicability of and conflicts with other Federal property disposal authorities
8. economic benefit to the Federal government, including protection and maintenance cost savings and anticipated consideration from the transfer.

Another criterion to be reviewed under the EDC implementing regulations is the proposed EDC's compliance with applicable Federal, state, and local laws and regulations. This type of legal review falls beyond the scope of USACERL's tasking and expertise, and is not addressed in this report.

After evaluating the validity of the information provided in the EDC application, USACERL determined whether the application was complete in terms of the

seven criteria specified in the EDC implementing regulations. (These criteria are discussed in Chapter 10, **Review of the Application for Completeness.**)

Finally, the USACERL work group compiled its findings into this report and a briefing for the sponsor. The final briefing was given to Army decisionmakers on 19 May 1997.

Metric Conversion Factors

U.S. standard units of measure are used throughout this report. A table of metric conversion factors is presented below.

1 in.	=	25.4 mm
1 ft	=	0.305 m
1 sq ft	=	0.093 m ²
1 cu ft	=	0.028 m ³
1 mi	=	1.61 km
1 lb	=	0.453 kg

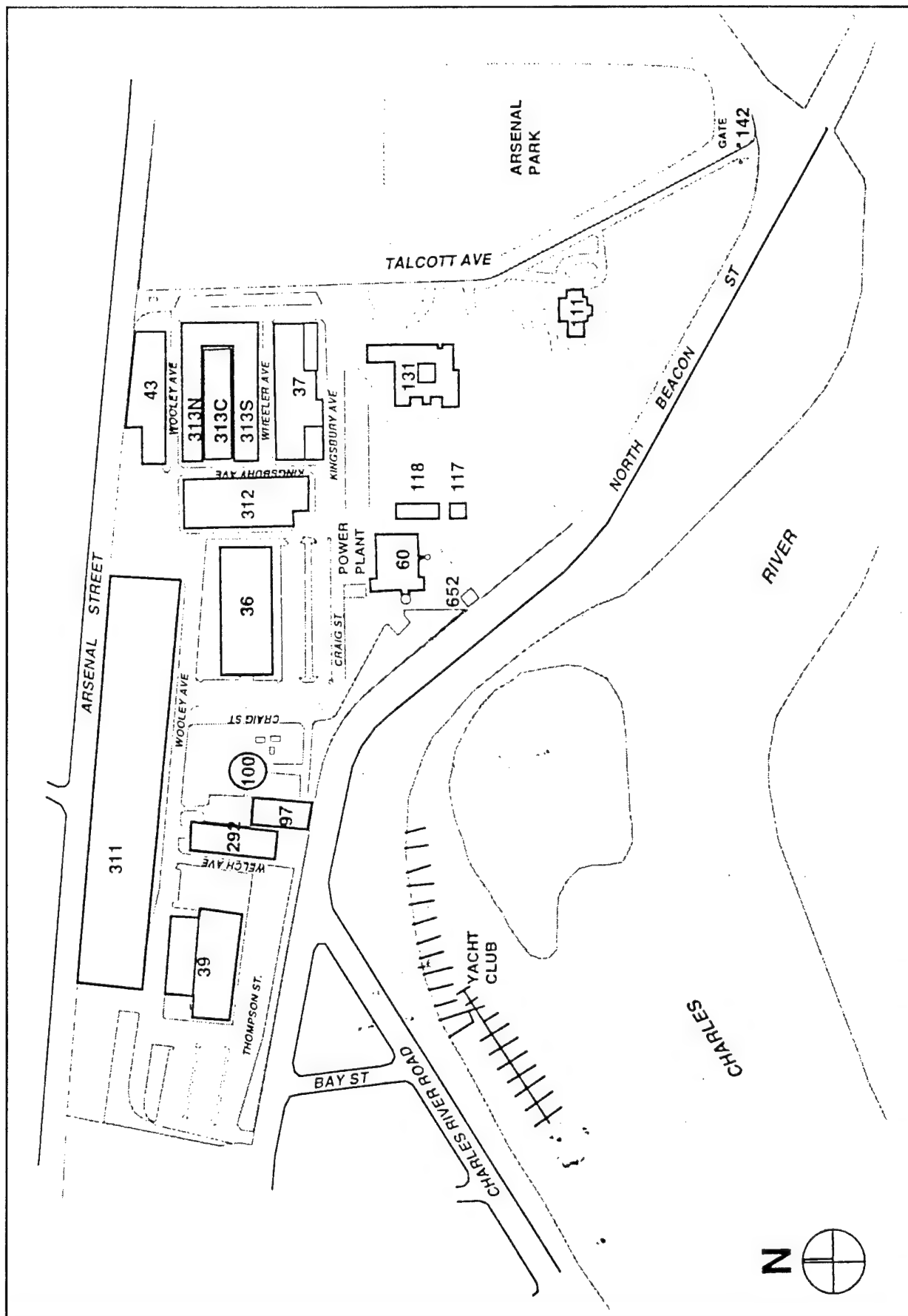


Figure 1. Map of AMTL, including the main transportation corridors of Arsenal and North Beacon streets.

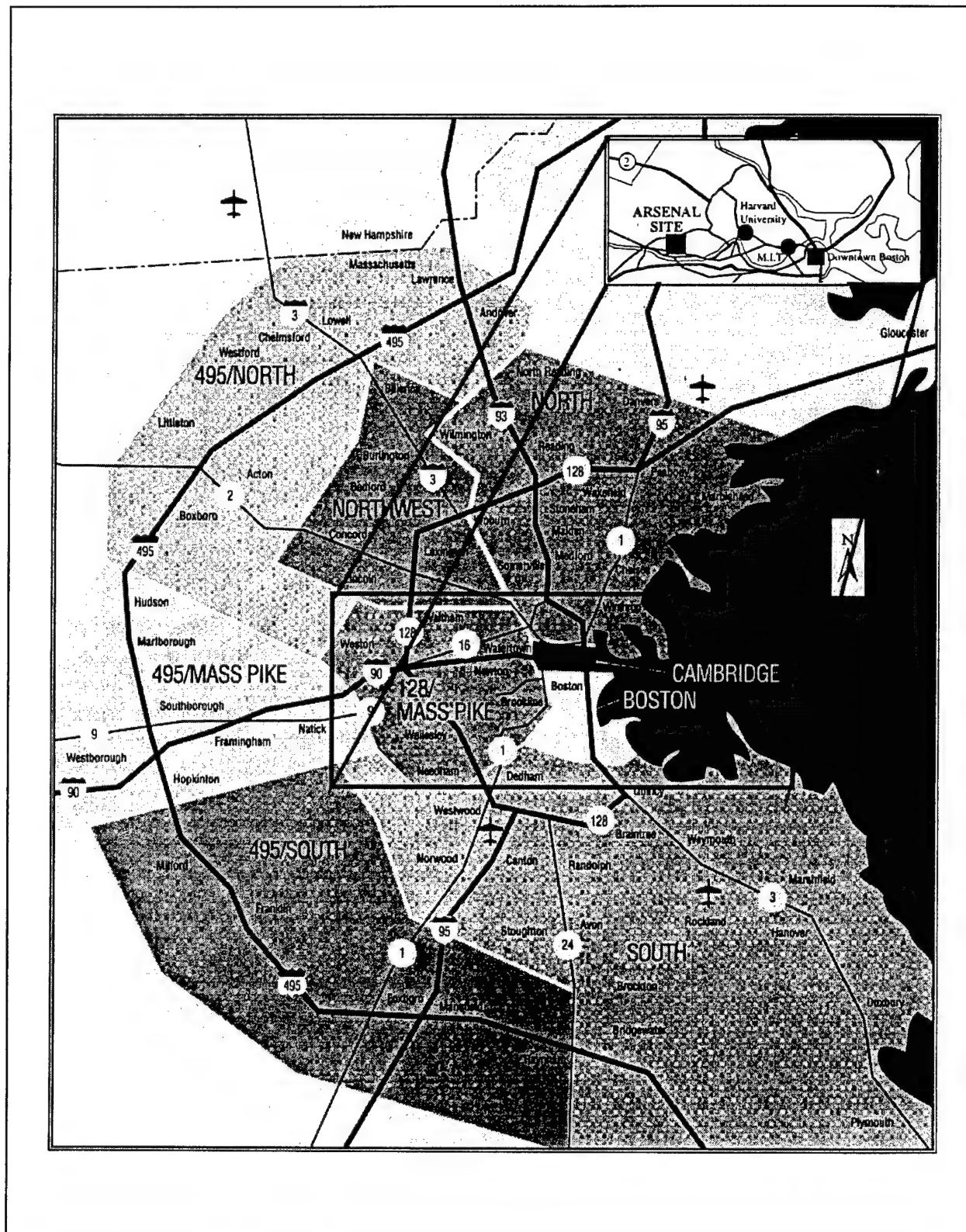


Figure 2. Map of the Boston Metropolitan Statistical Area showing major transportation corridors and real estate submarkets.

1 Adverse Economic Impact of the Closure on the Region and the Potential for Recovery After the EDC

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Background

Pursuant to 32 CFR Part 91.7, paragraph (5)(ii)(B), the prescribed content of the Economic Development Conveyance (EDC) application must include a description of the economic impact of a base closure on the local communities. This chapter addresses these concerns by examining the extent of closure impacts and whether the proposed Army Materials Technology Laboratory (AMTL) EDC request will facilitate a recovery of lost jobs and revenues.

Approach

To determine economic impacts from the closure of AMTL, USACERL first reviewed the February 1997 Reuse Plan Update, the U.S. Army Final Environmental Impact Statement (FEIS), and other referenced documents to determine the extent of the adverse economic impact experienced in the Watertown region as a result of the closure. Unfortunately, while these documents describe some of the adverse impacts that have resulted from the closure, they do not present a comprehensive socioeconomic analysis of the closure and proposed reuse scenarios to spur economic growth. Nor do these documents make any mention of AMTL budget figures for the year of closure. Accordingly, USACERL relied primarily on the Regional Input-Output Modeling procedure (RIMS II) that has

been developed by the Bureau of Economic Analysis to document these effects. RIMS II was specifically developed to offer a standardized methodology for quantifying positive and negative economic effects that result from a wide array of investment scenarios, including the closure of military bases.

Adverse Economic Impact of the Closure of AMTL

USACERL finds that the adverse economic impact on the Watertown region caused by AMTL's closure and realignment was significant, but not from a historical perspective. Although Watertown itself is relatively small, it lies in a well-developed area that has extensive ties to the Greater Boston regional economy. The FEIS recognizes this fact, and specifically defines an area that includes all of Suffolk, Essex, Norfolk, and Middlesex counties as the "Socio-economic Region of Impact" (ROI). These counties contain both the Greater Boston region and the bulk of the Cambridge region, which collectively form the fourth largest regional economy on the East Coast. Thus, any detrimental impacts that resulted from the closure have likely been distributed throughout a region much larger than Watertown itself. The following summarizes the detrimental economic impacts that occurred during 1988, the year of the AMTL closure.*

Employment

The AMTL closure likely resulted in an observable, but not significantly damaging, loss in regional employment. At the time of the closure decision in 1989, AMTL employed a total of 14 military personnel and 564 civilian employees.[†] However, the actual number of jobs lost in the Greater Boston region as a result of the closure is higher than this figure, since on-site employment at AMTL also indirectly supported additional off-site employment. The Watertown Arsenal Development Corporation (WADC) estimates indirect impacts from the closure at 400. Using the appropriate RIMS II multiplier, USACERL finds that approximately 2,075 on-site and off-site jobs were lost directly as a result of the closure. However, this loss occurred in a regional market supporting over 1.3 million jobs and amounts to less than 0.0016 percent of the total employment for the four-county ROI. The loss of these 2,075 jobs, evaluated in the context of

* All closure impacts presented in this chapter have been calculated in 1988 dollars (the year of the closure).

[†] Since 1989, all but 25 positions have been realigned or eliminated; the remaining positions are filled by a caretaker security force, persons supervising hazardous waste remediation, and maintenance and repair personnel.

this much larger regional market, is not likely to have drastically impacted the regional economy.

Household Earnings and Gross Output

Although the AMTL closure was likely a significant economic event for the Greater Boston area, it is unlikely that the AMTL closure had a markedly adverse impact on the total household earnings gross output for the regional area. Prior to the year of closure, the AMTL facility incurred locally-related budget costs of about \$23 million. This figure includes payroll costs, local material and supplies acquisition costs for AMTL, and the economic value of locally sourced contracting opportunities. Adjusted with the appropriate RIMS II multiplier, this figure calculates to a total lost economic output for the ROI of about \$48.8 million, or about \$14.4 million in total lost household earnings compared with a Boston MSA total output of \$1.2 billion in 1988.* Thus, it is likely that the Greater Boston area suffered a detrimental impact as a result of the AMTL closure, but unlikely that the scope of this impact was severe.

Potential for Economic Recovery

The AMTL Reuse Plan contemplates the realignment of about 578,000 sq ft of space in a total of eight buildings by commercial research and development (R&D) and manufacturing tenants. Analysis by USACERL suggests that full reuse of AMTL would create 1,200 to 1,600 on-site jobs at full build-out (see Appendix C, Table C11) with the bulk of these jobs being created in skilled high-tech manufacturing and R&D sectors. This on-site employment estimate appears reasonable, based on the proposed level of investment by the LRA, proposed reuse of AMTL facilities, and the current strong market demand for office and research and development space (see Chapter 2, **Extent of Short- and Long-Term Job Creation**, for more detail on job creation).

The FEIS does not consider these issues, stating only that "development of these facilities and construction of additional facilities...would create a long-term beneficial impact on socio-economics in the [region of influence]." Neither the FEIS nor the EDC application provides an estimate of likely gross revenue that

* These figures were compiled from information taken from the Regional Information System Report on Total Personal Income and Earnings by Industry, developed by the Bureau of Economic Analysis.

would accrue to tenants from tenant operations. Because these data are necessary to calculate gross output for an area, USACERL was not able to provide precise revenue and earnings estimates for post-redevelopment conditions at the AMTL facility.

However, even if it is assumed that only 1,200 on-site jobs will develop, this will still potentially generate a minimum of \$42 million direct-income impact, based on a regional average salary of \$35,000 a year.* Based on applicable RIMS II multipliers, this alone translates into a positive change in gross output of about \$88 million and an increase in household earnings of almost \$26 million. Based on previous Army employment levels at AMTL, this represents an almost three-fold increase in direct employment and a doubling of gross output and household earnings. Net gains in these economic indicators are precisely what an EDC is intended to facilitate.

Conclusions

The Town of Watertown, in addition to the Boston region as whole, is experiencing a strong economic recovery from the recession of the early 1990s (see Chapter 7, **Local and Regional Market Conditions**). This recovery is reflected in strong demand for office, industrial, and R&D property. USACERL has determined that, even under the most conservative assumptions, a full economic recovery from the closure of AMTL will be realized given the relative insignificance of the closure on the local economy and current market strength. In fact, the proposed EDC could potentially reuse the facilities at AMTL to an employment intensity that is roughly three times greater than previous Army employment levels.

* This figure only considers potential payroll figures, not gross revenue; thus, it necessarily understates the positive total impact of the AMTL realignment.

2 Extent of Short- and Long-Term Job Creation

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Background

The AMTL EDC application is required by Federal law to discuss job creation prospects for the proposed reuse of the AMTL facility. One of the principal eligibility criteria that the military must consider when reviewing an EDC application is the extent of short- and long-term job generation. Job creation, after all, is the primary intent of this "jobs centered" property disposal authority.

Although both the FEIS prepared by the U.S. Army Material Command and the AMTL Reuse Plan mention the prospect of job creation, neither document states with any degree of certainty the number of jobs that potentially could be created through effective redevelopment of the AMTL facility. This uncertainty was probably due to both the difficulties of accurately calculating such estimates and the distinct absence of available construction cost data, which are key indicators of short-term job creation, and end-user revenue data, which are used to predict long-term job creation.

In particular, projections of gross revenue from tenant operations were unavailable at the time of this writing. Nevertheless, USACERL was able to establish a baseline figure for short- and long-term job creation by applying the Regional Input-Output Modeling System (RIMS II) developed by the Bureau of Economic Analysis.

It must also be noted that the following projections are tied to an assumption of rapid absorption of existing and new gross square footage. Thus, the following

projections would likely not be valid for a partial-absorption scenario (as would be the case if some AMTL facilities were mothballed). Similarly, no explicit handling of development phasing was contemplated; rather, the following estimates are based on a short-term absorption schedule.

Approach

Following the standard procedure for applying an input-output analysis, USACERL first conceptually divided the economic impacts of the AMTL redevelopment into short- and long-term impacts. For purposes of this analysis, "short-term" refers primarily to impacts caused by the redevelopment process itself, including the jobs and economic effects created as a result of construction and maintenance activity. "Long-term" refers to the impacts caused by the ongoing activities of firms that will be located on the AMTL facility.

USACERL then developed a series of economic multipliers that capture both the direct and indirect economic effects of both short- and long-term activities. Since the elements of a regional economy are inherently interrelated, this approach offers an effective way of capturing the entire impact of a given event. For example, a set of jobs created at the AMTL facility will also give rise to an additional number of jobs located in the economic area surrounding AMTL. By using an economic multiplier, it is possible to project both the impact of on-site job creation (a direct effect), as well as the number of additional jobs created as a result of on-site jobs and economic activity (an indirect effect). Note, however, that lack of information about the volume of economic activity conducted by the future tenants of the AMTL facility limited the potential accuracy of the indirect long-term projections.

Extent of Short-term Job Creation

To calculate short-term job creation, USACERL calculated the likely capital costs of a full redevelopment of the AMTL facility, and then applied the applicable economic multiplier to find the total direct and indirect regional impacts. According to USACERL's engineering analysis (see Chapter 5, **Need and Extent of Infrastructure Improvements**), likely total capital costs for the redevelopment will amount to about \$40 million. Applying the appropriate RIMS II multipliers to this figure suggests that about 1,150 direct and indirect short-term jobs will be created as a result of the AMTL redevelopment process. The majority of these jobs will involve construction, landscaping, building fit-up, and similar activities.

Extent of Long-term Job Creation

To calculate the extent of long-term job creation, USACERL calculated the total number of on-site jobs that will likely be created as result of redevelopment at AMTL and applied the appropriate RIMS II indirect jobs multiplier to find total long-term employment impacts. This calculation is inherently less accurate than a total employment figure calculated from gross revenue. However, no reliable gross revenue estimates were available at the time of this writing since current gross revenue estimates necessarily predate tenant selection. Thus, the calculation was performed with an on-site employment estimate.*

To reasonably estimate the probable number of long-term on-site jobs created, USACERL compared the employment estimates provided in the AMTL Reuse Plan with estimates suggested by USACERL's standard engineering analysis. The Reuse Plan specifically suggests that about 1,200 to 1,500 permanent on-site jobs will be created; USACERL's engineering analysis generally supports this estimate, suggesting that about 1,500 to 1,600 jobs will be created.† Correlating these two estimates suggests that between 1,200 and 1,600 permanent on-site jobs will be created at full build-out. Adjusted with the RIMS II employee multiplier, this range suggests that approximately 3,800 to 5,100 total direct and indirect jobs will ultimately be created.

However, these forecasted levels of direct and indirect job creation must be qualified with two caveats. First, it is possible that total employment may be overstated due to intraregional relocation of industries and businesses. That is, some companies may be merely moving from one location in the Boston Metropolitan Statistical Area to another, creating no net positive impact on the regional economy.‡ Second, as noted above, the accuracy of these estimates is

* To accurately predict indirect employment effects, it is necessary to have reasonably precise information about the gross revenue created in the area of analysis, which would require detailed information about AMTL tenant activities. Since the specific composition of tenants at AMTL has not yet been determined, USACERL determined that current gross revenue estimates are likely too speculative to be useful.

† This estimate was found by multiplying the estimated developable square footage (provided by USACERL's standard engineering analysis) by applicable employee density ratios (also provided by the engineering analysis).

‡ This limitation would typically be overcome by simply selecting a larger regional area for analysis. In this case, however, selecting a larger area would have produced estimates based on a different study area than that used in the AMTL FEIS. To maintain comparability with the FEIS, the same study area was used.

also limited by the unavailability of gross revenue data and firm facts about the likely composition of tenant activities.*

Conclusion

As noted above, the extent of both short- and long-term job creation is linked to the absorption schedule for buildings and land within the EDC parcel. Because office and commercial space typically have higher relative employment densities than manufacturing and R&D uses, the sooner these types of uses are developed, the faster new jobs will be created. USACERL's analysis of the Watertown real estate market indicates that demand pressure for the AMTL facility will rapidly lead to new development, which will ultimately replace each job lost during the AMTL closing with up to three permanent new jobs.

* The RIMS II modeling system suggests that about 22 direct and indirect jobs will be created for each \$1 million in gross output produced by tenants at the AMTL facility. Calculations based on this multiplier would likely be more accurate than the preliminary long-term job calculations presented above.

† To accurately predict indirect employment effects, it is necessary to have reasonably precise information about the gross revenue created in the area of analysis, which would require detailed information about AMTL tenant activities. Since the specific composition of tenants at AMTL has not yet been determined, USACERL determined that current gross revenue estimates are likely too speculative to be useful.

3 EDC Application's Consistency With the Overall Redevelopment Plan

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Background

The Town of Watertown and the Arsenal Reuse Committee (ARC) have been actively planning the redevelopment and reuse of the Army Materials Technology Laboratory (AMTL) facility since the closure decision in 1989. This planning process is reflected in the creation of a Reuse Plan and its adoption by the ARC in November 1993. This reuse plan was subsequently revised and updated in November 1996 and again in February 1997 to reflect changes in the proposed development program and local market conditions. This review incorporates the latest changes to the AMTL Reuse Plan.

The objective of this chapter of the review is to determine whether the redevelopment implementation strategy proposed in the Watertown Arsenal Development Corporation (WADC) Economic Development Application (EDC) and related business plan are consistent with the adopted Watertown Arsenal Reuse Plan (including the February 1997 update) and other governing documents, such as the Memorandum of Agreement concerning maintenance of the historical character of the facility. Among the criteria set forth for evaluating consistency are: (1) does the application capture the spirit and intent of the reuse plan and (2) is the application consistent with the Reuse Plan's marketing strategy and implementation plan?

Conclusions

After reviewing the AMTL EDC application and adopted Reuse Plan, USACERL finds that the application is generally consistent with the goals, objectives, and implementation strategies set forth in the Reuse Plan. Perhaps the most significant change from the February 1997 Reuse Plan and the subject EDC request, is the inclusion of Building 131 in the EDC parcel. The Department of Education has withdrawn support for the Public Benefit Conveyance application for the subject building submitted to the Army by the Massachusetts School of Psychiatry. In response to this action, the WADC has requested the building under the EDC property transfer authority with an intended office reuse.

Like many other EDC requests reviewed by USACERL, non-EDC uses are integral to the attainment of Reuse Plan goals and objectives. Particular to AMTL, Building 111 (the Commander's Residence) and the 11 acres of the facility bordering the Charles River will play important roles in promoting environmental and historical preservation through public use. Although the uses proposed in the EDC application generally support these objectives, the EDC itself does not directly address them and instead concentrates primarily on facilitating the economic development goals of the Reuse Plan.

The application captures the spirit and intent of the Reuse Plan by meeting the following stated goals and objectives:

1. The application soundly accommodates Watertown's need for permanent economic growth elements and the key growth driver of current and foreseeable Greater Boston market conditions, by directing facility reuse toward the development of much-needed commercial space for office and R&D uses.
2. The application preserves the historic character and campus quality of the facility by defining 6 buildings as "historic properties of importance" and 10 as "historic buildings of value." In addition, the Historic Memorandum of Agreement will guide construction of new site improvements and buildings, ensuring design compatibility with existing historic structures. The proposed reuse also fully complies with the historic preservation mandates

* Buildings 37, 43, 111, 311, 312, and 313 are defined as Category II properties under the existing Memorandum of Agreement (MOA) between the Massachusetts State Historic Preservation Office and the Army. Buildings 36, 39, 60, 97, 117, 118, 131, 142, 292, and 652 are defined as Category III properties under the MOA.

provided by the Memorandum of Agreement between the Army and the Massachusetts State Historic Preservation Officer.

3. The application accommodates the need to promote access to the Charles River and other community resources by limiting on-site development intensity to a level that will not detrimentally impact the surrounding transportation infrastructure. The application also reasonably mitigates potential on-site traffic impacts facilitating minor off-site traffic infrastructure improvements.
4. Although the application does not contemplate any residential uses on-site, it does meet the general implicit goal of supporting and reinforcing existing community residential uses by providing complementary land uses and buffers.

The application is consistent with the Reuse Plan's marketing strategy and implementation plan as follows:

1. The application effectively identifies and programs infrastructure improvements necessary to make AMTL competitive with commercial facilities in the regional area, including the development of necessary structured parking and transportation access points.
2. The application correctly positions the facility to appeal to a diverse range of technology-related businesses. By marketing to a large and vibrant regional business sector, yet retaining the flexibility to accommodate changing market demands, the likelihood of successful reuse implementation increases dramatically.
3. The application attempts to forecast potential cash flows that indicate financial feasibility and ultimately the ability to implement the Reuse Plan, but the analysis lacked the necessary support and documentation to justify financial projections and a \$0 project net present value. Despite these limitations, USACERL's independently constructed assessment of the application's overall financial conclusions has been positive. (See Chapter 4, **Business Plan Review and Market and Financial Feasibility Analysis.**)

4 Business Plan Review and Market and Financial Feasibility

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Objective

The objective of this section is to provide a review and analysis of the financial feasibility of the Watertown Arsenal Development Corporation (WADC) EDC application and its business plan. USACERL's technical review of financial feasibility includes market analysis and the need and extent of proposed infrastructure investment (Chapter 5, **Need and Extent of Infrastructure Improvements**). Elements of importance in the review of the business plan include (DoD 1995):

- a property development timetable, phasing plan, and cash flow analysis (for 15 years)
- a market and financial feasibility analysis describing the economic viability of the project including:
 - an estimate of net proceeds over the projected development period
 - the proposed consideration and payment schedule to DoD
 - the estimated fair market value
- a cost estimate and justification for infrastructure and other investments needed for the development of the EDC parcel (Chapter 5, **Need and Extent of Infrastructure Improvements**)
- Local investment and proposed financing strategies for the development (also covered in Chapter 6, **Extent of State and Local Investment and Risk**).

Background

WADC is requesting a no cost EDC for approximately 30 acres and 13 buildings containing 637,741 sq ft of existing gross building space at the U.S. Army Materials Technology Laboratory (AMTL). WADC intends to reuse eight of the existing buildings and plans to demolish two buildings in their entirety and the central portion of the power plant. It is not clear from the applicant's reuse or business plan how the remaining buildings will fit into the overall redevelopment program. It should be noted that, at the time of this writing, all of the buildings listed below have been defined by the historical Memorandum of Agreement (MOA) as contributing to the character of the Historic District (USARMY MOA 1992). The reuse plan has identified future uses based on parcelization of the property that includes:

- Building 311 - Office/R&D
- Building 131 - Office
- Building 37 - R&D/Specialized Manufacturing
- Building 313 - R&D/Specialized Manufacturing
- Building 312 - R&D/Specialized Manufacturing
- Building 43 - Office/R&D
- Building 97/292 - Office/R&D
- Structured Parking
- Open Space and Recreation.

The reuse plan, according to WADC, provides a comprehensive framework and strategy to reuse the buildings, infrastructure, land, and open space to produce jobs and preserve historically significant resources. The primary focus of the reuse plan is to capitalize on the unique attributes of AMTL to attract new business and support existing industry while replacing lost jobs in the process. Given AMTL's privileged locational and structural attributes, the nature of the reuse is positioned to attract the best potential end-users during the proposed development horizon (6 years).

Approach

The approach to the technical review included a review of the entire EDC application package and supporting documents and reports. USACERL also conducted interviews with the Army Caretaker Force staff and U.S. Army Corps of Engineers (USACE), New England Division action officers who are currently handling the real estate disposal of AMTL (USACERL site visit to AMTL,

Watertown, MA, 11-12 February 1997). To aid in the analysis and documentation of the financial feasibility of the WADC business plan, USACERL developed a series of computer spreadsheet models, pro formas, and tables. The output from these analyses are provided in Appendix B of this report and are intended to provide much of the detail required in the documentation of findings. In general, the enclosed spreadsheets are organized into two major groups: (1) a recast of the WADC business plan assumptions and discounted cash flow results, and (2) USACERL-developed data tables, analyses, and findings of financial feasibility. After a general discussion of these analyses, USACERL will present its findings.

Recast of WADC Business Plan Scenario

The first step USACERL completed in its evaluation of business and operational plan feasibility was to recast the applicant's assumptions into a computer spreadsheet-based pro forma. This accomplished two objectives: (1) to check the applicant's mathematical calculations, methodology, and proper application of discounted cash flow methodology and (2) to give USACERL analysts an opportunity to fully understand the assumptions that support the applicant's cost and revenue projections. Once reconciled and understood, this recast serves as a baseline model for developing and testing alternative business plan scenarios.

Table B1 in Appendix B is a recast of WADC's business plan discounted cash flow analysis. It contains the following information: (1) land sales revenues, (2) grant/loan revenues, (3) demolition costs, (4) on-site improvement costs, (5) parking costs, (6) off-site improvement costs, (7) operating costs, (8) net revenues, and (9) project net present value (NPV).

USACERL Scenario Development

USACERL developed alternative scenarios under CERL1 to test the sensitivity of four changes to the WADC's business plan assumptions: (1) 100-percent surface parking, (2) structured parking cost sharing, (3) environmentally encumbered buildings, and (4) applying USACERL-developed building sales.

Additionally, USACERL developed two project views related to structured parking costs and applied them to the above scenarios as appropriate. The structured parking assumptions are as follows: (1) reduction in structured parking costs and (2) reduction in structured parking requirements.

100-percent surface parking scenario. The first assumption change relates to the high costs associated with the construction of two parking garages as prescribed in WADC's reuse plan and EDC application. The applicant argues that structured parking is required to attain projected levels of job creation and economic development. With structured parking the LRA estimates that the EDC parcel could accommodate over 1,500 employees and their automobiles. Moreover, restrictive covenants promulgated by the Massachusetts Historic Preservation Officer relative to site distances, impervious surfaces, and preservation of open space would apparently be satisfied by such an investment.

However, the February 1997 Reuse Plan Update for AMTL (p 67) does articulate a 100-percent surface parking alternative. Under this scenario, only buildings 311, 131, 97, and 292 are reused under the full commercial program due to the inherent parking constraints associated with surface parking. The remaining buildings at AMTL would be mothballed until some future date when structured parking could be accommodated, or would be demolished to create additional space for surface parking or open space. It is possible that WADC would be forced to adopt the 100-percent surface parking scenario if market conditions or developer interest declined, or if currently identified sources of financing were withdrawn or reduced in magnitude.

Table B2, Discounted Cash Flow Analysis - CERL1, summarizes the discounted cash flow analysis results for a 100-percent surface parking scenario for 11 percent and 6 percent discount rates over USACERL's developed 6-yr pro forma horizon. Three project views are captured in Table B2: (1) the total project analysis view, which removes capital improvements in structured parking and increases WADC's operations and maintenance (O&M) costs on buildings in addition to increased costs with surface parking, (2) project analysis with USACERL building sales holding all other assumptions constant, and (3) project analysis with environmental encumbrances which delays the sales of buildings by 1 year, holding all other assumptions constant.

Parking structure cost sharing scenario. The second assumption change accepts structured parking as a viable alternative for the redevelopment of the facilities at AMTL, but explores the possibility of cost sharing between WADC and private sector developers. The estimated \$9 million (1997 dollars) required to construct two parking garages would be a substantial investment for most communities. As such, alternative financing mechanisms such as developer contributions to structured parking costs would most likely be examined. Under CERL1, it is assumed that the private sector investors and developers in AMTL would finance 50 percent of parking structure costs with the balance financed by

WADC. Furthermore, it is assumed that developers and investors would demand a further discount from building residual values. This discount is estimated to be 50 percent for each building. Many inherent problems are associated with a cost sharing scheme of this nature, including: (1) assumption of garage ownership, (2) assumption of garage maintenance and liabilities, (3) cost sharing formulas, and (4) contractual relationships among and between WADC and individual investors and developers. Chapter 6, **Extent of State and Local Investment and Risk**, provides a more detailed discussion of the issues associated with cost sharing.

Table B3, Discounted Cash Flow Analysis - CERL1, summarizes the discounted cash flow results of for 11 percent and 6 percent discount rates for USACERL's developed 6-yr pro forma horizon. The structured parking cost sharing scenario assumes that WADC will leverage financing 50/50 with private sector developers and investors. Three project views are captured in Table B3: (1) the total project analysis view, which assumes a 50 percent reduction in WADC's structured parking costs and residual building values, (2) a project analysis that assumes a 50 percent reduction in structured parking costs and USACERL-developed building values, and (3) all assumptions held constant from project view 2 with the exception that building sales are delayed 1 year because of environmental encumbrances.

Environmental encumbrances scenario. The third assumption change reflects the tight timelines associated with the environmental remediation efforts underway at AMTL. Although the preliminary schedule furnished by Weston Consultants (1997) indicated that all building remediation will be completed no later than December 1997 or January 1998, the possibility exists, as with all environmental remediation projects, for delays and unforeseen contingencies. To appropriately consider this reality of military base closure and redevelopment, USACERL created a scenario around the possibility of environmentally encumbered buildings at the time of the LRA's projected sales date. This scenario makes a highly conservative assumption that building sales would be delayed 1 year from the time of anticipated sale.

Table B4, Discounted Cash Flow Analysis - CERL1, summarizes the discounted cash flow results of for 11 percent and 6 percent discount rates for USACERL's developed 6-yr pro forma horizon. The environmentally encumbered scenario assumes all building sales will be delayed one year due to unforeseen contingencies relative to remediation and granting of a finding of suitability to transfer (FOST). Three project views are captured in Table B4: (1) the total project analysis view WADC's total capital improvement program and building sales, (2) project analysis with reduced parking structure costs as developed by

USACERL, and (3) project analysis with USACERL's reduced parking requirements.

USACERL building sales scenario. The last USACERL developed scenario addresses that lack of substantive support contained in the EDC application or reuse plan relative to residual building values. WADC appears to have developed residual building values based on a mixture of inappropriate sales comparables located mostly outside of the AMTL submarket and a residual land value analysis with little support in terms of rental rates and building fit-up costs. In USACERL's opinion, WADC's residual building values were wholly unsupported and required an independent residual value analysis because building sales constitute nearly half of WADC's revenue stream. Therefore, USACERL developed residual values based on (1) independent market analysis for rental rates, operating costs, and vacancies and (2) an independent engineering analysis to determine costs associated with redeveloping each building based on facade improvements, internal demolition, and tenant fit-up. These independently developed values were then used for USACERL scenario development and sensitivity analysis. A description of the tables supporting USACERL's analysis follows:

Table B5, Discounted Cash Flow Analysis - CERL1, summarizes the discounted cash flow results for 11 percent and 6 percent discount rates for USACERL's developed 6-yr pro forma horizon. The USACERL-developed building value scenario assumes that WADC's total estimated residual building values are the "worst-case scenario" and that USACERL's total developed values represent the high end of the valuation range. Three project views are captured in Table B5: (1) the total project view with WADC's proposed capital improvement program, (2) project analysis with reduced parking structure costs, and (3) project analysis with reduced parking requirements.

Table B6, Scenario and Sensitivity Analysis, summarizes the impacts to revenues, operating costs, operating cash flows, capital costs, total cash flows, and NPVs as result of USACERL-developed assumptions. The table provides three views: (1) reduced structured parking costs, (2) reduced structured parking requirements, and (3) environmental encumbrances. Additionally, the sensitivity of the changed assumptions is measured grouping the assumptions into four categories: (1) 100-percent surface parking, (2) parking structure cost sharing, (3) environmentally encumbered buildings, and (4) USACERL-developed residual building values.

Tables B7 through B14 include a residual building value analysis for buildings 311, 131, 312, 37, 313, 43, 292, and 97, which support USACERL's building sales scenario. The direct capitalization approach to valuation is used to determine an indicated building value; then building fit-up costs are subtracted to arrive at residual building value. Also included is a 5-yr discounted cash flow pro forma based on residual building value and fit-up costs to determine individual building financial feasibility.

Tables C12 through C19 include detailed engineering and architectural building fit-up costs for buildings 311, 131, 312, 37, 313, 43, 292, and 97 to support the valuation analysis contained in tables B7 through B14.

Business Plan Review and Findings

According to the application, the business plan for AMTL uses the development approach to valuation relating land/building value to the potential income to be generated and to the cost of improvements. Current market data is used to support land prices and infrastructure improvements. Buildings demolition and capital improvements, including the proposed construction of two parking structures, are projected in a 6-yr pro forma to estimate the NPV to accrue from the reuse of AMTL as articulated in the EDC application and reuse plan.

Although the business plan provided in the EDC application is weakly supported in terms of the details necessary to perform an effective technical review and analysis, USACERL obtained considerable supporting documentation and studies to perform a thorough review and analysis. The following section reviews and analyzes a critical component of the EDC application, the market and financial feasibility of WADC's business plan. The following review of the business plan has been organized to generally correspond with the applicant's overall cash flow statements and supporting studies and analyses.

Market Feasibility

The proposed reuse for the marketable buildings (311, 131, 312, 37, 313, 43, 292, and 97) include office, office/research and development (R&D), office/specialized manufacturing, and R&D/specialized manufacturing. R&D buildings typically include office to light industrial space, while office is generally defined as supporting space for R&D and specialized manufacturing activities. WADC's business plan provides building prices of \$18 per developable square foot for Building 131 and \$10 for Building 311. Similarly, building 312 has a price of \$12/sq ft while the remaining buildings demonstrate an apparent price of \$15/sq ft for developable space. These figures are reflected in the land revenues section

of the 6-yr pro forma of the business plan expressed as a residual value for each of the buildings. The next three sections discuss market conditions for each of the proposed uses as reflected in Appendix B (Reuse Plan Update) of the EDC application.

Office. Employment projections suggest significant growth in demand for office space. As a regional submarket of the greater Boston area, Watertown office space is not as exclusive in terms of quality and location relative to that of the downtown Boston market. Nevertheless, it offers opportunities for growing firms, particularly class B seekers, to take advantage of comparatively lower rents without significant locational sacrifices. As evidenced by record low vacancy rates in the 7 percent range, demand for office space is likely to continue amidst strong market conditions. Much of the existing office use in Watertown exists as support for the high number of R&D and hi-tech industries in the Cambridge and Route 128 markets. Rental rates, both in downtown Boston and in the suburbs, have favored landlords over tenants. With Boston central business district (CBD) rates in the \$32.00/sq ft (gross) range and \$23.50/sq ft (gross) for suburban space, there has been little room for leasing-related landlord concessions. Absorption rates have also been strong with a net 1996 figure of over 1.7 million sq ft, a significant improvement over the previous year. A Boston company has expressed interest in Building 311 to use as office, research, and laboratory space, referencing the high costs and lack of space in the Cambridge market.

Research and development. The greater Boston area has enjoyed much popularity over time for its reputation as a major R&D center, especially in the fields of software/computer related technologies, biotechnology, and other hi-tech development. R&D space has seen a more dramatic improvement within the adjacent Cambridge and 128/Mass Pike markets with vacancy rates as low as 6.5 and 7.5 percent respectively for the second quarter 1996. Overall suburban R&D vacancy rates remain comparatively high at 16.4 percent. Fueled by a strong economic environment, high-tech and healthcare companies have taken advantage of economical R&D/office leasing opportunities in the greater Boston area. Practically unavailable class A space, coupled with growing needs, has constrained these space users and forced them to seek more economical and flexible R&D space in the suburbs. Despite this, construction levels have remained low to avoid speculative downturns. Over the past 3 years, vacancy has declined by 15 percent on 8.1 million sq ft of R&D absorption. With the strong Cambridge R&D market, spillover effects are likely to drive space users in need of larger and more flexible space into the Watertown area. A Cambridge company has submitted a letter of interest for Building 311 with plans to

relocate their world headquarters, which is the Internet division of a larger parent company.

Specialized manufacturing. While overall manufacturing employment has been on the decline, particular segments within this sector have enjoyed and are projected to experience steady growth. These areas include electronic components, medical instruments, printing and publishing, and computer-related development which borders on R&D space in type and quality. The greater Boston market experienced an overall 2.5 to 12.9 percent decline in vacancy rates with an absorption of 2.6 million sq ft. Rents edged upward where tenants were able to find high bay Class A space, while older, well-located facility rents increased somewhat. Assuming lower demand in 1997 and accounting for build-to-suits already scheduled for occupancy during the year, vacancies should reach the 10 percent mark. Large users will be forced to secondary locations because of insufficient space in the more attractive sites.

AMTL provides a good opportunity for specialized manufacturing users, particularly those also in need of office space, as it offers close proximity to the high-tech, research-oriented Cambridge market. Potential tenants might include computer component or biotechnology manufacturers, among others. An existing Watertown space user has shown interest in Building 311 to use for components manufacturing (WADC EDC Application, Appendix A).

USACERL findings. In the business plan market analysis, considerable attention is given to the current development economics of the greater Boston real estate markets. Highlighted in the analysis are the dominant service sectors where significant employment growth is projected for the submarket spanning from Cambridge to the Route 128 corridor. The market findings of the applicant and USACERL were used to develop residual building values and confirm WADC absorption schedules for reusable buildings. As a site developer, WADC intends to construct site infrastructure improvements and the structured parking required to achieve full development of the site and preservation of historic structures. The public investment will be critical to the Arsenal's ultimate redevelopment.

WADC's absorption estimates appear to fall within a reasonable range as supported by independently gathered market data. Suburban Office/R&D market absorption reached 2.6 million sq ft in 1995 and 580,000 sq ft for the same year in the Cambridge market. Similarly, the Mass Pike/128 area experienced total office/R&D absorption of 855,000 sq ft. In the suburban office market, there has been a consistent improvement in vacancies to under 10 percent—a trend indicating inventory absorption. Little office space is available

for tenants looking to relocate or expand to larger facilities from downtown Boston or the Cambridge markets. Current R&D vacancy rates are also below the 10 percent mark, making this segment very competitive, which is particularly true for the inner-suburban markets and not for the outer markets, where vacancy rates remain at over 16 percent. The implication of these figures serve to favor AMTL's absorption prospects as evidenced not only by the strong market conditions but also with already included letters of interest in the EDC application from potential tenants. These potential tenants have expressed interest in Building 311 (the largest structure), which offers the greatest flexibility and potential for large space users and is clearly the one that will generate the largest revenue and number of jobs of all the reusable buildings.

High rental activity in the office/R&D as well as in the specialized manufacturing segments will aid in the overall marketability of AMTL's properties. Despite its secondary office location status, Watertown benefits from proximity to Cambridge and downtown Boston. Another comparative drawback to the site is its lack of sufficient accessibility in terms of public transportation to the Turnpike or primary access roadways as well as lacking a T station (Boston light rail). Successful office development must offer space at rental rates below those offered in the Cambridge market while providing adequate levels of public investment in infrastructure by WADC. R&D rents vary depending on the user's requirements, yet they have remained high in their respective markets. Route 128/Watertown R&D rents range from \$8 to \$10/sq ft NNN (the tenant is responsible for taxes, insurance, and maintenance) while those in Cambridge range from \$20 to \$30/SF NNN and up depending on the nature of the improvements. Industrial rates in the Route 128/Watertown market average \$5 to \$6 NNN with minimal tenant improvements.

USACERL-developed rental rates incorporate data from various sources, including the Spaulding & Slye Report published in January 1997. Rates were calculated using the median point between the quoted rates for the Cambridge and the 128 markets as defined by the report. While it would be inappropriate to allocate rates solely on the basis of one market or the other, USACERL believes the method used more accurately reflects the true potential achievable rates for AMTL. The estimated rental rate used in USACERL's analysis for office space was \$25.11 on a gross basis (exclusive of tenant electric). R&D rental rate used was \$10.27 NNN based on the above methodology. Similarly, the specialized manufacturing rate was \$6.06 NNN. These rates were adjusted by an annual 2 percent factor relative to the projected year of sale for the respective building. Given mixed uses for most buildings (e.g., office/R&D), rental rate allocation was performed under a 50/50 building reuse scenario.

The LRA's projected sales prices per developable square foot for each of the buildings generally fall outside of the range developed by USACERL. One reason is difference in developable square footage figures. USACERL measured the eight reusable buildings at AMTL and developed gross square footage estimates. From that, tenant improvements, common areas, and mechanical rooms were subtracted to arrive at net developable square footage estimates which were applied to USACERL rental rates. Table 4.1 compares USACERL and WADC residual building values. Tables B7-14 in Appendix B provide technical support for USACERL's developed residual values.

Table 4.1. Summary of WADC and USACERL-developed residual building values.

Building	WADC			CERL		
	Residual Value (\$)	Square Feet	Residual Price/SF (\$)	Residual Value (\$)	Square Feet	Residual Price/SF (\$)
131	861,000	46,000	18.72	1,541,269	55,922	27.56
311	3,050,000	305,000	10.00	5,758,081	317,966	18.11
312	811,000	65,000	12.48	509,837	37,629	13.55
37	876,000	54,000	16.22	830,549	41,226	20.15
313	1,087,000	67,000	16.22	692,049	47,348	14.62
43	709,000	42,000	16.88	744,128	32,998	22.55
292	440,000	25,000	17.60	1,523,083	24,750	61.54
97	258,000	15,000	17.20	156,723	20,900	7.50
Total	8,092,000	619,000		11,755,719	578,739	

Independently developed rental rates were used to calculate potential gross income, from which vacancy, collection loss, and operating expenses were subtracted to arrive at net operating income (NOI). A conservative market capitalization rate of 11.5 percent was then divided into NOI to arrive at the indicated values for reusable buildings. The final step subtracts total building fit-up costs (see Chapter 5, **Need and Extent of Infrastructure Improvements**, for a more detailed discussion of the residual value methodology) to arrive at the residual value.

A critical concern to the applicant was the ability to provide sufficient parking levels, not only to satisfy the minimum market driven requirements, but also to mitigate and offset some of the more negative impacts from less than optimal accessibility and associated risks of new infrastructure developments. The inability to offer sufficient parking is likely to jeopardize the viability to command going market rents. As such, residual values will be reduced commensurate with building cash flows. Furthermore, the timing of the sales is also likely to be affected in this case. Of paramount importance is the potential of not achieving the targeted number of new jobs resulting from less-than-optimal redevelopment efforts.

Development Timetable, Phasing Plan, and Cash Flow Analysis

The business plan provides a 6-yr cash flow analysis in Appendix G of the EDC application package. WADC's assumptions are questionably outlined and supported in the EDC application. Supporting capital cost estimates and programming were developed in accordance with the timing of the sales of the buildings. Sale of each of the buildings is scheduled to occur over the 6-yr horizon beginning in 1998. The methodology used in the preparation of the cash flow statements does not explicitly reveal the assumptions nor the exact relationship between timing of the cash flows. A number of cash flow statement items do not exhibit clear growth patterns.

In terms of parking improvements, it appears as if programming is to coincide with the projected sale and fit-up of significant square footage. That is, the first structure is projected to be completed in the year 1999, a year after the sale of Building 311 but before the projected occupancy date. Similarly, the second structure is programmed to be completed by 2001, the year of sale of the last remaining buildings (43, 292, and 97). Such projections are found to be reasonable by USACERL.

Operating cost cash flows appear in concert with the large carrying costs associated with the holding period of each of the buildings; namely the time it takes between fit-up and occupancy. Hence, the highest operating costs, specifically utility expenses, can be seen in the years 1998 and 1999.

WADC suggests a no-cost conveyance as demonstrated by the need to fulfill a project gap of approximately \$8.45 million through grants and loan financing and uses the business plan's cash flow analysis to support these estimates. Substantial capital improvements are programmed in Years 2 (1998) through 5 (2001), resulting mostly from parking structure requirements.

Cost Estimates and Justification for Infrastructure

WADC estimates 6-yr capital costs at \$14,797,400 (WADC 1997, pp 13-17). Improvements are generally separated into four discrete categories (figures in future value dollars):

1. Demolition - \$1,961,000
2. On-site Improvements - \$1,757,300
3. Parking - \$10,495,400
4. Off-site Improvements - \$572,000

Demolition includes the full demolition of Buildings 39 and 36, and internal demolition and boiler removal for Building 60. *On-site improvements* include the repair and fit-up of all AMTL utilities systems, internal roadways and public spaces. *Parking* includes surface parking improvements and the construction of two 450-space parking structures. *Off-site improvements* include traffic signals and basic traffic corridor improvements to ease traffic impacts stemming from redevelopment.

The costs for improvements are spread from Year 2 (1998) through Year 5 (2001) with the most substantial investment programmed at \$5,190,700 for Year 2. Investment in this year includes the following: (1) completion of the building demolition program, (2) completion of a majority of on-site improvements, (3) commencement of the off-site improvement program, and (4) partial construction of parking garage #1. WADC proposes no cost-sharing of capital improvements with private sector investors and developers in any phase of the redevelopment. WADC also identifies a need for \$1,992,600 in operating costs to include project staff budgets, legal assistance, utilities, security, and maintenance contracts among others.

The construction of two 450-space parking garages stands as the largest capital improvement cost at \$9,000,000 (1997 dollars). WADC argues that the garages are necessary to maximize reuse of the 30 acres and 13 existing buildings at AMTL and to spur job creation. In the absence of structured parking, AMTL facilities would only be reused partially due to the limitations of surface parking, therefore limiting job creation and economic growth. Land economics in this region are such that structured parking is a common development alternative to address high development densities and land values.

In terms of building fit-up, the cost burden has been shifted to the private sector by WADC. The EDC application and reuse plan provide little support in terms of fit-up costs or available developable square footage to support residual building values. In fact, total revenues accruing from building sales vary from \$8,355,000 in the business plan to \$12,912,099 in the reuse plan (WADC 1997). The EDC application states total direct costs for building rehabilitation to be \$75 to \$130 per square foot, but does not define the scope of work, provide any apparent empirical support for such figures, or identify the cost on a building-by-building basis (WADC 1997, p 11). Tenant improvements are estimated to be \$0 to \$50 per square foot, but again, it is not clear to what buildings these costs apply or what the improvements involve. Coupled with this apparent lack of support is the absence of accurate developable square footage for reusable buildings, which drive fit-up costs and, ultimately, residual building value. A

detailed discussion of cost estimates and justification for infrastructure can be found in Chapter 5, **Need and Extent of Infrastructure Improvements**.

USACERL findings. Although the proposed level of investment proposed by WADC is financially self-sustaining and will strongly encourage the desired end of job creation and economic development, USACERL takes exception to the proposed construction of two parking garages. The combination of surface and structured parking will yield over 1,500 parking spaces on site at AMTL. However, the Watertown Arsenal Reuse Environmental Notification Form (ENF) which serves as the primary environmental guidance document for the preparation of the Environmental Impact Report (EIR) for the Commonwealth of Massachusetts, states that total on-site parking should be restricted to 1,150 spaces (Earth Tech 1997, p. 3). The justification for the constraint is centered on the potential adverse environmental impacts such as air, noise, and water pollution as well as off-site traffic impacts that can only be partially mitigated under any reuse intensity scenario. Furthermore, the Army Final Environmental Impact Statement (FEIS) limits on-site parking to roughly 1,300 spaces under the high-intensity reuse (HIR) scenario due to the generation of daily vehicle trips and parking requirements that would be at levels "substantially in excess" of those being borne by AMTL (USAMC 1995 pp 5-20,22). In addition, the ongoing concerns with air quality and noise pollution are addressed.

To reflect this constraint on parking, USACERL's alternative parking improvements scenario eliminates one parking garage and increases capacity of the other to 640 stalls for a total cost of \$6,422,000 under the maximum scenario. This cost compares with WADC's estimate of \$9,000,000 for two garages. Coupled with USACERL's developed scenario for 740 surface parking spaces, a total of 1,380 parking spaces would be available for tenants at AMTL. Based on USACERL's independently developed high range of employment projection of 1,600 jobs, a 220 parking space deficit would be realized. However, this scenario still yields an employee parking ratio of 2.4 spaces per 1,000 sq ft based on USACERL's estimate of 578,740 sq ft of developable space. This ratio compares with the average AMTL submarket ratios of 2 to 3 spaces per 1,000 sq ft. Hence, USACERL's developed scenario is generally consistent with mitigation requirements prescribed in both the ENF and FEIS, as well as local market realities.

In terms of the remaining proposed on- and off-site capital improvements, USACERL independently verified costs and need. Proposed improvements are reasonable and prudent when evaluated in the context of economic development and rapid job creation. In sum, WADC's demolition, on-site, and off-site

improvements fall within USACERL's developed cost range of reasonableness and are necessary for economic growth.

Finally, USACERL developed independent estimates of developable square feet and fit-up costs based on proposed building reuses and installation property data. Table 4.1 compares WADC's estimates of developable square feet with USACERL's, and includes estimates for individual building fit-up. Although USACERL's independent estimate of 578,740 developable square feet falls below WADC's 619,000 sq ft, USACERL's analysis is more rigorous and reflective of the inherent rehabilitation opportunities and constraints present in AMTL reusable buildings. In terms of fit-up, estimates were calculated for each building (with the exception of Building 60) based on historical facade improvements, interior demolition of obsolete structures, and tenant fit-up. Building 60 was eliminated from USACERL's alternative scenario analysis due to the lack of demonstrable support for the fit-up or reuse of the former power plant. USACERL's developed fit-up costs serve as the basis for alternative scenarios under *Market Feasibility Analysis* later in this chapter.

Local Investment and Proposed Financing Strategies

WADC outlines its available financing options in the *Sources and Uses of Funds* section of the EDC application (WADC 1997, pp 18-19). Required outlays for the reuse effort fall into the two broad categories of capital improvements and operating costs. According to WADC's business plan, only 50 percent of total redevelopment costs will be offset by the sale of nine reusable buildings (including Building 60). However, WADC provides a discussion relative to the funding shortfall that outlines access and availability of various grant funding and debt service vehicles that will cover projected operational deficits.

Because a majority of the required redevelopment costs (\$5,820,700 of \$16,778,300 total) are programmed for Year 2 (1998) when land sales revenues are projected to be \$3,911,000, WADC will require a capital infusion to cover these costs. In fact, with the exception of Years 1 and 6 (1997 and 2002, respectively), every outyear in the pro forma yields operational deficits in terms of building sales versus expenditures. However, WADC does discuss and outline sources of funding to cover financial shortfalls.

Potential sources of funding, as outlined by WADC, include: (1) Economic Development Administration (EDA) infrastructure grants - \$3,000,000, (2) Public Works and Economic Development (PWED) grant - \$2,000,000, (3) Community Development Action Grant (CDAG) - \$1,000,000, (4) development bonds secured by Watertown taxes - \$2,450,000, (5) a Massachusetts Development

Finance Agency (MDFA) line of credit for \$144,000, and (6) a MDFA bridge loan for \$250,000. These sources of financing total \$8,435,000, which accounts for 50 percent of the WADC revenue stream and demonstrate a strong commitment to long-term project financial feasibility.

USACERL findings. The level of investment proposed by WADC is reasonable and necessary with the exception of two parking structures to achieve the reuse plan's goals of economic development and job creation. The business plan as developed by WADC is financially self-sustaining with the full structured parking program included. The applicant forecasts a reasonable revenue stream based on building sales, grants, and loans of \$16,790,000 over the 6-yr planning horizon. These revenues will offset \$16,778,300 in total redevelopment costs.

With the use of USACERL-developed residual building values and reduced structured parking requirements and costs, required local investment decreases by nearly \$3 million, thus increasing the probability for project financial feasibility. These scenarios and alternatives are discussed at length in the following sections.

Market Feasibility Analysis

In determining the ultimate financial feasibility of the reuse effort, it is critical to first establish market feasibility (i.e., whether a sufficient market exists to absorb the development's offered space within the projected planning horizon at pro forma market assumptions). The application provides satisfactory support to conclude that sufficient market potential exists to absorb AMTL space. The foundation for this conclusion is primarily grounded in current developer interest in the facilities at AMTL as documented by letters of interest contained in Appendix A of the EDC application. USACERL's independent market analysis further supports WADC's absorption schedule and potential market interest in the 30 acres and 8 reusable buildings at AMTL. Under WADC's building absorption schedule, all buildings designated for reuse are scheduled to be purchased by Year 5 (2001) and occupied by Year 6 (2002). In developing alternative scenarios, USACERL did not attempt to accelerate building sale schedules to a more aggressive level. However, market pricing of rents and building sales were adjusted to be more reflective of the current real estate boom underway in the Greater Boston area and AMTL submarket. The following sections set out assumptions and findings of the CERL1 developed scenario.

USACERL-developed Scenarios

Based on the conclusions and findings drawn from the analysis of WADC's discounted cash flow analysis, USACERL developed its alternative scenarios with a focus on four assumptions related to: (1) 100-percent surface parking alternative, (2) structured parking cost sharing, (3) environmental encumbrances on reusable buildings, and (4) applying USACERL-developed residual building values, providing an analysis of the impact to the income stream and resulting NPV ranges.

CERL1 Scenario Assumptions

In developing the CERL1 assumptions, WADC's business plan was used as the baseline for comparison. USACERL assumptions and impacts for CERL1 are as follows:

1. A 100-percent surface parking scenario was applied to the applicant's business plan pro forma. The applicant programs the construction of two parking garages in Year 2 (1998) and Year 4 (2000) to satisfy a 900 parking space requirement. However, structured parking costs represent the highest cost in terms of WADC's capital improvement program strategy at 63 percent of total redevelopment costs. This represents a significant financial burden on WADC. The surface parking scenario assumes there is lack of financial capacity, declining strength in the regional real estate markets, and withdrawn political support for structured parking. The assumption change reflects the removal of structured parking, an increase in facility layaway and O&M costs on non-reusable buildings, and additional surface parking costs. Two additional project views are also applied: (1) impact of USACERL-developed building residual values and (2) impact of environmental encumbrances. The results of the assumption changes were found to be significant:

- WADC building sales and capital improvement costs (net of the two parking structures) were used
- USACERL-developed building sales with or without environmental encumbrances were deemed inappropriate when considered in the context of constrained development opportunities
- Holding all other variables constant, the 100-percent surface parking scenario increased NPV from \$371,933 to \$4,459,463 at a 6 percent discount rate. At an 11 percent discount rate, NPV increased from \$581,137 to \$4,129,300 (lines 4-23 of Table B6, in Appendix B).

2. The financing structure of the parking garages was modified in assumption 2 from a 100-percent WADC-financed project as prescribed by the applicant, to a 50/50 cost sharing venture between WADC and private sector developers and investors. This assumption change is reflective of the substantial investment and risks associated with the construction of two \$4.5 million parking garages solely underwritten by WADC. Under this developed scenario, it is assumed that private sector developers and investors would require a 50 percent discount from developed building residual values in order for cost sharing with WADC to be financially feasible. Two additional project views are also applied: (1) impact of USACERL-developed building residual values and (2) impact of environmental encumbrances with USACERL building sales. The results of this assumption change are:

- USACERL-developed building sales were used given unconstrained parking and development
- environmental encumbrances were excluded from the preferred scenario
- cash flow and NPV impact
 - an additional \$2,374,650 in net cash flow is generated (line 34, Table B6) from WADC's baseline as a result of a 50/50 parking structure cost-sharing arrangement
 - NPV impacts were significant as well, increasing NPV to \$2,310,939 and \$2,239,484 for 6 and 11 percent discount rates, respectively.

3. Environmental cleanup issues, which are so pervasive in the military base redevelopment arena, were considered as an assumption change for the discounted cash flow analysis. The preliminary facility clean-up schedule provided by Weston Consultants estimates that all remediation work at AMTL will be completed by December 1997 or January 1998. However, environmental cleanup schedules are prone to slip completion dates and milestones. The assumption change reflects the realities of environmental clean up by conservatively delaying programmed building sales by 1 year for unforeseen cleanup contingencies and the attendant problems associated with the granting of a finding of suitability to transfer (FOST). Two additional project views are also applied: (1) impact of USACERL-developed parking structure costs and (2) impact of reduced structured parking requirements. The impacts from this scenario change are listed below:

- WADC residual building values were used to represent the low range of values to reflect the uncertainty and risk associated with environmental encumbrances

- the project analysis used reduced structured parking requirements for cash flow analysis
- 6-yr cash flow and NPV impact—cash flow increases by \$2,969,707 to \$2,981,407, and NPV increases to \$1,986,736 (lines 42-44 of Table B6).

4. WADC outlines its approach to building valuation on pp 11 and 12 of the EDC application and p 68 of the reuse plan. Residual values between the respective analyses from a total building sales revenue stream of \$8.35 million in the EDC application to \$12.9 million (exclusive of building 131) in the reuse plan update. Not only do residual building values vary widely between the two documents, but developed values are poorly supported. The three key variables associated with the pricing of reusable buildings at AMTL are rental rates, developable square footage, and fit-up costs. Although there are discussions of rental rates contained in the application and reuse plan, there is no clear line of reasoning to arrive at building values. Likewise, the associated fit-up costs of the buildings at AMTL, which will involve significant facade improvements because of historic district designation, internal demolition of obsolete facilities, and tenant improvements, are completely unsupported.

Therefore, USACERL-developed estimates of residual building values are based on independent research of market rental rates, operating costs, and vacancies, in addition to an independent engineering and architectural fit-up cost estimates. USACERL-developed residual building values were applied to the discounted cash flow analysis to represent the high range of building values. Two additional project views are also applied: (1) impact of USACERL-developed parking structure costs and (2) impact of reduced structured parking requirements. The net impacts from assumption changes developed in scenario 4 are included below:

- USACERL's estimated low range of NPV is based on WADC's total capital improvement program, USACERL-developed building sales, and an 11 percent discount rate
- USACERL's estimated high range of NPV is based on reduced structured parking requirements, USACERL-developed building sales, and a 6 percent discount rate
- cash flow and NPV impact for low range of estimated NPV—an additional \$3,400,100 in net cash flow is generated as a result of applying USACERL's building sales to WADC's pro forma, and NPV increases from \$581,137 to \$3,267,852 at an 11 percent discount rate (lines 47-54 of Table B6)
- cash flow and NPV impact for the high range of estimated NPV—an additional \$6,369,807 in net cash flows is generated as a result of applying USACERL-developed building sales to a reduced structured parking

requirement, and NPV increases from \$371,933 to \$5,357,734 at a 6 percent discount rate (lines 47-54 of Table B6 in Appendix B).

Scenario and Sensitivity Analysis

The scenario and sensitivity analysis table (Table B6) was developed to provide a convenient and helpful summary of USACERL's scenario and assumption change impacts. Table B6 in Appendix B summarizes the impacts of USACERL assumptions on revenues, operating costs, operating cash flows, capital costs, total cash flows, and NPVs. The NPV calculations summarized in Table B6 are for 11 and 6 percent discount rates, relating to WADC's assessment of projects risk (6 percent is the applicant's cost of capital) and the possibility of unforeseen development program contingencies and substantial project underwriting from the private sector in terms of building rehabilitation (11 percent). The sensitivity of the assumptions represented in CERL1 was compared with USACERL's recast of WADC's business plan discounted cash flow analysis. The change in cash flows and corresponding change to NPV for the most appropriate assumptions were identified and detailed in Table B6 and are summarized in Table 4.2.

USACERL findings. As detailed in the tables in Appendix B, the CERL1 scenario had a significant impact on WADC's business plan pro forma, the most significant being the use of USACERL building sales, which increased NPV nearly \$5 million from \$371,933 (6 percent discount rate). In sum, the USACERL-developed scenario demonstrates a higher probability of financial feasibility for the plan, which is discussed in the following section.

Table 4.2. Impact of CERL1 Scenario assumptions.

	Change to Cash Flow (\$)	Change to NPV @ 6% (\$)	Change to NPV @ 11% (\$)
1. Impact of 100% Parking Scenario	4,907,870	4,087,530	3,548,163
2. Impact of Parking Structure Cost Sharing	2,374,850	1,939,006	1,658,347
3. Impact of Environmentally Encumbered Buildings	2,969,707	1,614,803	834,731
4. Impact of USACERL-Developed Building Sales	6,369,807	4,985,801	2,686,715

Financial Feasibility Analysis

Traditional commercial real estate investment analysis requires the investor to make reasonable forecasts of potential gains and exercise sound judgment as to the level of risk they are exposed to in an effort to determine the financial feasibility of the development. A technique to assist in this evaluation is to discount the forecasted future cash flows and the estimated residual of the development at the end of the investment period back to NPV. The rate of discount is determined by an assessment of the level of risk and can be equated to the required rate of return the investor seeks with similar investments.

Although financial feasibility was demonstrated by WADC through a careful balance of building sales, fiscal packaging, and timing of proposed capital improvement costs, the ability of WADC to pay fair market value, or any value for that matter was not effectively demonstrated in the business plan. The following discussion centers on what the NPV, or investment value of the 30 acres and 13 buildings contained within the EDC parcel should be given a set of reasonable and foreseeable assumption changes. The range of USACERL-developed values under the CERL1 scenario will be discussed in the remainder of this section.

In arriving at a reasonable range of NPVs for AMTL, USACERL considered an array of reasonable outcomes based on market conditions, information contained within WADC's EDC application, and independent sources. The highest potential NPV for the project was calculated under the 100-percent surface parking scenario with USACERL-developed building sales using a 6 percent discount rate. However, this developed scenario and its resulting *positive* \$8,208,355 NPV is unrealistic based on the 6 percent discount rate, which does not adequately capture the associated risk relative to a constraint on redevelopment and job creation. Furthermore, the use of USACERL building sales most likely overstates the true impacts of an all surface parking scenario. One of the key marketing elements of WADC's reuse plan is structured parking, which ensures safe and adequate parking for the tenants of all reusable buildings at AMTL. Developers and investors would most likely demand a discount on building sales to account for parking uncertainty, the presence of mothballed buildings, and the inability to expand operations on site.

Conversely, the lowest NPV calculated for the project based on USACERL's assumption changes was *negative* \$22,285 at a 6 percent discount rate. This value is based on the environmentally encumbered buildings scenario with WADC building values and full capital improvement program, to include the construction of two parking garages. This scenario is likely not realistic given

the fact that environmental remediation programming does not currently appear to conflict with WADC's scheduled building sales. Furthermore, it is unlikely that WADC would implement its full capital improvement program in the face of environmental encumbrances and the attendant development uncertainty in terms of building sales and values which, in part, support capital investments.

USACERL based its final determination on the range of estimated values for AMTL under two discrete scenarios. The first scenario is based on the following assumptions: (1) USACERL-developed residual building values, (2) WADC's full capital improvement program to include the construction of two parking garages, and (3) an 11 percent discount rate. The second scenario is based on the following assumptions: (1) USACERL-developed building sales, (2) reduced structured parking requirements, and (3) a 6 percent discount rate. These assumptions are defensible in the context of the level of information and support provided in WADC's EDC application, independently gathered data and analysis, and the risk and uncertainty associated with the redevelopment.

A high value of \$5,357,734 was estimated using a 6 percent discount rate. This lower rate, which is WADC's developed rate, captures WADC's cost of capital but also attempts to quantify some of the intangible and tangible investment returns such as job creation and tax revenue generation. Moreover, this scenario captures the current strength of the AMTL real estate submarket in terms of market demand for the buildings at AMTL for office, R&D, and specialized manufacturing as well as considering WADC's apparent overstatement of parking requirements. This NPV compares with the low range of \$3,267,853, which is calculated using an 11 percent discount rate to reflect additional investment and risk, and WADC's full capital improvement program in the event of unforeseen construction or capital improvement contingencies. Therefore, the USACERL estimated range of value for AMTL falls between an NPV of \$3,267,852 and \$5,357,734 based on 11 and 6 percent discount rates, and full capital improvement program and reduced structured parking requirement, respectively.

Conclusion

USACERL finds that WADC's business plan has a strong probability of achieving financial feasibility as set out by WADC and developed through USACERL's scenarios. The NPV of the business plan as set out by WADC falls within the range of *positive* \$371,933 to \$581,137 based on 6 and 11 percent discount rates. USACERL calculated WADC's proposed plan as alternative

scenario CERL1 at \$3,267,852 and \$5,357,734 based on 11 and 6 percent discount rates and USACERL-developed building values, and a full capital improvement program and reduced structured parking requirements, respectively. This estimated range also considers the possibility of a 100-percent surface parking scenario, and the estimated range of NPVs based on USACERL scenario development. Therefore, USACERL finds the reasonable range of values for WADC's business plan to be as shown in Table 4.3.

Table 4.3. USACERL's estimated range of NPVs for WADC's business plan.

Estimated Business Plan Valuation	11%	6%
USACERL estimated range of NPVs of business plan	\$3,267,852	\$5,357,734

5 Need and Extent of Infrastructure Improvements

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Objective

The objective of this chapter is to evaluate the need and extent of the proposed infrastructure improvements contained in the WADC EDC business plan and 1997 Adopted Reuse Plan within the context of job creation and economic development. This objective will be accomplished by examining proposed improvement cost estimates to determine reasonableness and if there is a clear relationship between capital investments and WADC's desired goal of job creation.

Background and Approach

USACERL engineers conducted a site visit to AMTL on 11-12 February 1997 to perform the necessary condition assessments of facilities contained within the proposed EDC parcel. The USACERL infrastructure team evaluated the installation's infrastructure distresses and carrying capacity to establish a benchmark with which WADC's proposed improvements and attendant costs could reasonably be compared. With this information, the team determined the condition of the infrastructure, essential infrastructure repairs, different capacity improvement scenarios, and estimated infrastructure deterioration rates. USACERL then estimated the cost of improvements to the infrastructure (through improving the condition or increasing the capacity) that would encourage economic development.

Infrastructure Improvements

Need and Extent of Infrastructure Improvements

USACERL's general approach to determining infrastructure condition and validity of proposed capital improvements was similar to other EDC reviews. Personnel from USACERL conducted an independent assessment, examined the current condition of facilities, determined current and future functionality/capacity, gathered supplementary information, and developed cost estimates for the infrastructure systems proposed in the Reuse Plan and EDC application (as well as all the alternative USACERL infrastructure scenarios in Appendix C). USACERL determined possible repair or alteration scenarios with cost estimates and compared those with WADC proposed estimates to determine reasonableness.

The evaluation process was divided into two parts. The first part estimated the level of investment to bring AMTL up to the minimum acceptable condition to be reused—minimum scenario. The second part was a maximum-scenario estimate of how the cost of improvements might increase under less favorable conditions. The cost estimates developed on the following pages reflect the magnitude of costs for minimum and maximum scenario.

Condition Assessment Procedure

Infrastructure condition assessment is a multistep process as follows:

1. The infrastructure is separated into groups of related systems (e.g., roads, utilities) (see Table C1 in Appendix C)
2. Specific information is gathered concerning the current state of the systems
3. The present condition of each system is rated (condition rating)
4. USACERL compares the rated condition with the condition necessary for reuse as proposed in the EDC application, which is the basis for “functionality” or “carrying capacity” ratings.

Tables C2 and C3 (in Appendix C) show the rating processes for condition and functionality, as well as the correlation between a condition/functionality rating and the type of maintenance and repair (M&R) required to restore the system.

Improvement Assessment

Once a system's condition and functionality have been established, the extent of infrastructure improvements to the system can be assessed. Identifying the best solution for encountered deficiencies is part of USACERL's evaluation of the reuse plan and the application submitted by WADC. In addition, USACERL developed alternative scenarios to identify the most cost-effective solutions to WADC's proposed capital improvement program while maintaining the spirit and intent of the Reuse Plan. Some of these developed scenarios serve as the basis for USACERL scenario analysis contained in Chapter 4.

Condition and Functionality Summary and Repair Scenario

Table 5.1 shows the overall condition and functionality of EDC infrastructure systems at AMTL. USACERL rated the overall condition of AMTL in the “Very Good” condition rate, and the functionality in the “Fair” range.

Table 5.1. AMTL infrastructure condition and functionality.

Infrastructure System	Existing Rate	
	Condition	Functionality
Site Utility Work	Excellent	Fair
Traffic Signals	Excellent	Poor
Traffic Corridor Enhancements	Excellent	Good
Building Demolition	N/A	N/A
Boiler Demolition and Removal	Fair	Fair
Internal Roadways	Very Good	Poor
Public Spaces and Plaza	N/A	N/A
Initial Phase Surface Parking	Good	Good
Structured Parking Deck #1	N/A	N/A
Structured Parking Deck #2	N/A	N/A
Overall Infrastructure Rating	Very Good	Fair

Table 5.2 compares WADC and USACERL infrastructure improvement cost estimates. WADC estimates the total cost to improve the infrastructure at \$14.1 million. USACERL estimates the minimum cost to improve the infrastructure to range between \$13.4 million and \$15.5 million to facilitate economic development, and between \$14.8 million and \$17.2 million as a possible total improvement cost under a worst-case scenario. For building demolition cost, note that USACERL considered Buildings 36, 39, and 60 interior, which were programmed in the EDC application, in addition to Buildings 313 C, 117, and 118, and the additions on Buildings 37 and 97, which were contained in the Reuse Plan and will most likely need to be demolished based on WADC's proposed site configuration.

Table 5.2. Infrastructure improvement cost comparison (in 1997 dollars).

Project Description	WADC	USACERL			
		Minimum Scenario Low (\$)	Minimum Scenario High (\$)	Maximum Scenario Low (\$)	Maximum Scenario High (\$)
Cost Item	Cost (\$)				
Site Utility Work	975,000	772,000	866,000	1,062,000	1,256,000
Traffic Signals	250,000	231,000	273,000	243,000	288,000
Traffic Corridor Enhancements	300,000	383,000	453,000	383,000	453,000
Building Demolition	1,960,000	2,520,000	2,620,000	2,683,000	2,789,000
Boiler Demolition and Removal	250,000	382,000	451,000	491,000	581,000
Internal Roadways	200,000	295,000	349,000	1,130,000	1,337,000
Public Spaces and Plaza	500,000	642,000	759,000	642,000	759,000
Initial Phase Surface Parking	625,000	218,000	257,000	218,000	257,000
Structured Parking Deck #1	4,500,000	4,000,000	4,728,000	4,000,000	4,728,000
Structured Parking Deck #2	4,500,000	4,000,000	4,728,000	4,000,000	4,728,000
Total Infrastructure Improvements	14,060,000	13,433,000	15,484,000	14,852,000	17,176,000

Even though not all WADC line items necessarily fall within USACERL's developed range of reasonableness, USACERL finds that the *total* dollar amounts are reasonable with the WADC estimate (\$14 million) falling in between the minimum (\$13.4 million) and the maximum (\$17.2 million) USACERL scenario.

The following sections provide the results of the condition and functionality survey gathered by USACERL, including the possible M&R to improve condition/functionality, and the costs estimated to perform the improvements. Appendix C tables provide the necessary additional technical support for USACERL's infrastructure cost estimates.

Site utility work.

Condition: The combined condition of the site utility infrastructure falls at the bottom of the "Excellent" range. The site utilities include the domestic water system, the storm sewer system, the sanitary sewer system, the natural gas system, the electrical distribution system, and the telephone distribution system.* WADC will have to do very little to maintain these systems in current conditions. Repairs should include replacing one or two manholes and replacing limited amounts of pipe and electrical line. The estimated costs to perform these improvements should range from \$772,000 to \$866,000 and are explained in greater detail in Appendix C.

Functionality: The combined capacity of the site utility infrastructure is at the bottom of the "Fair" range. The systems that will require the most investment to improve reuse capacity are the electrical distribution system, the natural gas system, and the telephone communications system. Each of these systems could require up to total replacement to increase their capacity within the context of the proposed level of development contained within the Reuse Plan. USACERL estimates the costs to perform these improvements to range between \$1,062,000 and \$1,256,000, which are explained in greater detail in Appendix C.

WADC estimates the cost to perform site utility work at \$975,000. This estimate is between condition improvement cost and the functionality improvement cost, so USACERL concludes that the WADC cost is reasonable.

* The telephone, gas, and electrical systems are controlled by the respective private companies on the Army property.

Traffic signals.

Condition: The condition of the existing traffic signal at Talcott Avenue and Arsenal Road is at the middle of the "Excellent" range; however, it is located in a very awkward position and should be relocated as explained below. Therefore, USACERL did not perform a condition assessment cost estimate.

Functionality: Two traffic signal lights under consideration in this work item have a functionality rating at the bottom of the "Poor" range. These lights are at Talcott Avenue and Arsenal Street and at North Beacon Street and Charles River Road. If WADC relocates the signal at Talcott and Arsenal and installs a traffic signal at North Beacon Street and Charles River Road, they will greatly enhance the capacity of the lights. USACERL took two approaches to this issue. One approach was the minimum amount of investment it would take to perform this work (i.e., installing one signal and relocating another). This estimate ranged from \$231,000 to \$273,000. USACERL then developed an estimate based on the proposed level of trip generation at AMTL precipitated by the successful implementation of the Reuse Plan. This approach was defined as removing one existing signal, installing two new signals, installing traffic medians, and restriping intersections. The estimate for this approach ranged from \$243,000 to \$288,000.

WADC estimates the cost to perform off-site traffic improvement work at \$250,000. This estimate falls within the range of both estimates, so USACERL concludes that it is reasonable.

Traffic corridor enhancements.

Condition: The condition of the primary traffic corridors that access AMTL are at the middle of the "Excellent" range. However, under their current configuration, they cannot meet the function for which they are needed under the Reuse Plan. Because the capacity of this system overrides the condition, USACERL did not conduct a cost estimate to maintain the excellent condition.

Functionality: Because traffic in and around the installation will affect the redevelopment, WADC proposes to improve the two major off-site roads (Charles River Road and Arsenal Street). These roads have a functionality rating in the middle of the "Good" range. Improvements should include retiming several traffic signals, improving an intersection, and installing "no turning" lanes. USACERL estimates the cost to do this work in the range of \$383,000 to \$453,000. WADC estimates the cost to do this work at \$300,000. This cost is

below the USACERL estimate; however, USACERL determined that it still remains within a range of reasonableness.

Building demolition.

Condition: In the case of building demolition, the condition phase does not apply because WADC will demolish buildings to create "green" space or to ensure the adequate provision of space for other infrastructure improvements and development densities.

Functionality: To achieve the goal of a campus-like setting (Reuse Plan, p 15), WADC proposes to create open or "green" space. This proposal will mean the selective demolition of less historically significant buildings or building additions, i.e., Buildings 36 and 39. Additionally, WADC will have to "gut" the interior of Building 60 to gain additional reusable space. The cost to perform this work (demolishing and "gutting") should be from a minimum range of \$1,895,000 to \$1,970,000 to a maximum range of \$2,273,000 to \$2,363,000.

WADC estimates this cost at \$1,960,000. This estimate falls within the minimum range, so USACERL concludes that it is a reasonable cost.

As USACERL studied the reuse plan and application, it became apparent that additional selective demolition of buildings and parts of buildings would have to occur. The additional buildings that cause an adaptive or site reuse constraint and, therefore, should be considered for demolition include the shed addition on Building 37, the addition on Building 97, the middle wing of Building 313. The cost to do this work should be from a minimum range of \$2,520,000 to \$2,620,000 to a maximum range of \$2,683,000 to \$2,789,000. Because this estimate includes all of the buildings that should be demolished to ensure that the reuse plan is implemented pursuant to articulated goals and objectives, USACERL included these additional costs in all other engineering and business plan analyses.

Boiler demolition and removal.

Condition: The condition of the boilers in Building 60 is at the top of the "Fair" range. The boilers are old and energy inefficient. If WADC desires to use the heat distribution system, it should be replaced to attain maximum efficiency. Because WADC is not planning to reuse the boilers, USACERL did not perform a cost estimate to improve the condition of the system.

Functionality: WADC will need to remove the boilers from Building 60 in order to reuse the building effectively and safely, giving a capacity rating at the bottom of the "Fair" range. USACERL developed two scenarios for the removal of the boilers. The first scenario was to remove all known asbestos in the boiler room and then remove the boilers. By studying previous asbestos surveys (Western 1992), USACERL estimates that the cost to remove all of the asbestos and the boilers should range from \$491,000 to \$581,000.

However, USACERL learned from the Army Caretaker Force that AMTL has already removed nearly three quarters of the asbestos in the boiler room. Therefore, the cost to remove the remaining amount will be reduced from the original amount. USACERL estimates the cost to remove the remaining asbestos and the boilers to range from \$382,000 to \$451,000.

WADC estimates the cost to do this work at \$250,000. This estimate is below USACERL's estimate. One probable reason for the wide variance is that WADC's estimate could include salvage value for the boilers. Therefore, USACERL concludes that this estimate could be reasonable, but in the absence of additional information, a firm determination cannot reasonably be made.

Internal roadways.

Condition: The condition of the internal roadways is toward the bottom of the "Very Good" scale. To improve the condition, WADC should perform spot repairs and consider an overlay to accommodate the first phase of redevelopment. However, because the functionality of the roadways is going to change, USACERL did not estimate the cost to maintain current conditions.

Functionality: The capacity of the internal roadways is at the bottom of the "Poor" range. To improve the capacity, USACERL approached this project with two scenarios. The first scenario was to widen the existing roads approximately 20 ft (10 ft for each side) to accommodate diagonal and parallel parking. USACERL estimates the cost for this scenario to range from \$295,000 to \$349,000. The second scenario was to totally remove the road and install a new road 40 ft wider (20 ft for each side) to accommodate head-on parking. This cost should range from \$1,130,000 to \$1,337,000.

WADC estimates the cost to do this work at \$200,000. This estimate is significantly lower than what USACERL has estimated. A probable reason for this difference is that WADC included only the repair of roadways themselves and not roadways and on-street parking in the cost estimate. Therefore, USACERL concludes that this estimate is not reasonable. Additionally, WADC provides

inadequate support relative to the configuration of internal roads and on-street parking configurations.

Public spaces and plazas.

Condition: A very limited amount of public space exists within the EDC parcel. Because WADC is creating significantly more space, the functionality of this system will override the condition. Therefore, USACERL did not perform a cost estimate to improve the condition.

Functionality: The functionality of the existing public space is at the bottom of the "Very Poor" range. To meet goals of open space articulated in the Reuse Plan (p 15), and consequently increase functionality, WADC will have to eliminate many of the existing parking lots and replace them with parks, sidewalks, and brick plazas. USACERL estimates the cost to do this to range from \$642,000 to \$759,000.

WADC estimates the cost to develop the public spaces and plazas at \$500,000. This estimate is below USACERL's range of reasonableness most likely as a result of a lack of specificity relative to public plaza programming and level of investment.

Initial and second phase surface parking.

Condition: The remaining parking lots are in "Good" condition. WADC will have to spot repair potholes and cracks and then apply a slurry seal to improve and maintain the condition. Because the functionality of the system will override the condition, USACERL did not estimate the cost to improve the condition.

Functionality: USACERL determined the functionality of the eight remaining parking lots as "Good." To improve the functionality, WADC should install curbs and gutters, and resurface and landscape the remaining parking lots. The estimated cost to do this work should range from \$218,000 to \$257,000.

WADC estimates the cost of this project at \$662,000. This cost is significantly higher than USACERL's and is not reasonable. A probable reason for this difference is that WADC did not separate the repair of the roadways adjacent to the parking and the repair of the parking lots themselves.

Parking Structure #1.

Condition: No parking garages exist, so this section does not apply.

Functionality: To encourage the redevelopment of the Arsenal, WADC is proposing the installation of a parking garage structure for 450 cars in the upper northwest corner of the installation, directly east of Building 311. Because there is not an existing structure, the functionality rating does not apply. The estimated cost to do this should range from \$4,000,000 to \$4,728,000.

WADC estimates the cost of building this garage at \$4,500,000. This estimate falls within the range estimated by USACERL, so it is concluded to be reasonable.

Parking Structure #2.

Condition: No parking garages exist, so this section does not apply.

Functionality: To achieve the maximum job creation at the former arsenal, WADC is proposing the installation of a parking garage structure for 450 cars in the center of the installation. Because there is not an existing structure, the functionality rating does not apply. The estimated cost to do this should range from \$4,000,000 to \$4,728,000.

WADC estimates the cost to build this garage at \$4,500,000. Again, this estimate is concluded to be reasonable by USACERL.

Parking Issues***Proposed Scenario***

Parking capacity to encourage and sustain economic development emerges as a primary constraint upon the scale and intensity of the redevelopment. Table 5.3 shows that, of the total redevelopment infrastructure costs, the parking costs are a very large percentage of the total amount (nearly 70 percent). The combination of surface parking (600 spaces) and parking garages (900 spaces) will yield 1,500 total parking spaces as proposed by WADC.

Table 5.3. Parking improvements (in 1997 dollars).

	WADC			USACERL Minimum Scenario		USACERL Maximum Scenario	
Project Description	No. of stalls	Cost (\$)	No. of stalls	Low (\$)	High (\$)	Low (\$)	High (\$)
<i>Cost Item</i>							
Internal Roadways	438	200,000	438	295,000	349,000	1,130,000	1,337,000
Surface Parking	233	625,000	233	218,000	257,000	218,000	257,000
Parking Deck #1	450	4,500,000	450	4,000,000	4,728,000	4,000,000	4,728,000
Parking Deck #2	450	4,500,000	450	4,000,000	4,728,000	4,000,000	4,728,000
Total Parking Improvements	1,571	9,825,000	1,571	8,501,000	10,046,000	9,348,000	11,050,000
Remaining Projects		4,235,000		4,930,000	5,422,000	5,504,000	6,126,000
Total Infrastructure Improvements		14,060,000		13,433,000	15,468,000	14,852,000	17,176,000

USACERL Alternative Scenario

The Watertown Arsenal Reuse Environmental Notification Form, which serves as the primary environmental guidance document for the preparation of the Environmental Impact Report for the Commonwealth of Massachusetts, states that the total on-site parking should be restricted to 1,150 spaces (Earth Tech 1997, p 3). The justification for the constraint is centered on the potential adverse environmental impacts, namely air, noise, water pollution, and off-site traffic impacts which can only be partially mitigated under any reuse intensity. Furthermore, the EIS limits on-site parking to roughly 1,300 spaces under the highest reuse-intensity scenario. The justification is primarily tied to the generation of daily vehicle trips and parking requirements that would be "substantially in excess" of those being borne by AMTL (USAMC 1995, pp 5-20, 22).

To reflect this constraint on parking, USACERL looked at a number of possible alternative scenarios to capture environmental concerns. These scenarios included different sizes of parking garages in combination with different amounts of surface parking. These scenarios included taller and wider parking garages and underground parking. Some scenarios encountered unique engineering problems (high water tables, space requirements) that could not be easily resolved within the scope of this analysis. Of all the different scenarios, USACERL felt that the scenario of building only one parking garage of 640 spaces and installing surface parking in lieu of the second garage fit best with the "spirit and intent" of the redevelopment plan. This alternative scenario will yield 1,380 parking spaces. As demonstrated by Table 5.4, a substantial project impact is realized as total parking costs decrease from \$10,046,000 (Table 5.3) to \$7,112,000 under the high end of USACERL's minimum scenario.

Table 5.4. USACERL parking alternative scenario (in 1997 dollars).

	AMTL			USACERL Minimum Scenario		USACERL Maximum Scenario	
Project Description	No. of Stalls	Cost (\$)	No. of Stalls	Low (\$)	High (\$)	Low (\$)	High (\$)
<i>Cost Item</i>							
Internal Roadways	438	200,000	438	295,000	349,000	1,130,000	1,337,000
Surface Parking	233	625,000	233	218,000	257,000	218,000	257,000
Parking Deck #1	450	4,500,000	640	5,434,000	6,422,000	5,434,000	6,422,000
Parking Deck #2	450	4,500,000	0	0	0	0	0
Repair Parking Lots	0	0	69	71,000	84,000	71,000	84,000
Total Parking Improvements	1,571	9,825,000	1,380	6,018,000	7,112,000	6,853,000	8,100,000
Remaining Projects		4,235,000		4,930,000	5,422,000	5,504,000	6,126,000
Total Infrastructure Improvements		14,060,000		10,948,000	12,534,000	12,357,000	14,226,000

Surface Parking

Because there are a large number of existing surface parking stalls, USACERL also looked at the scenario of 100-percent surface parking, as opposed to a combination of structured and surface parking. The applicant states that the existing parking can be reconfigured to support a maximum of 600 parking stalls using mostly parallel parking. By using a combination of parallel, diagonal, and mostly head-on parking, USACERL was able to obtain 866 surface parking spaces. Under this scenario, Buildings 37, 43, 312, and 313 are mothballed due to the constraint of on-site development density and incur recurring annual O&M costs. (The methodology for calculating the additional O&M costs is explained in Chapter 9, **Economic Benefit to the Federal Government** of previous USACERL EDC technical reviews.)

Table 5.5 demonstrates a significant cost impact from the WADC baseline of \$10,046,000 (Table 5.3) and USACERL's parking structure scenario cost (Table 5.4) of \$7,112,000. USACERL took two different approaches to this scenario. The first approach was to apply a slurry seal to all existing parking lots. The cost to make this improvement should range from \$609,000 to \$719,000. The second approach was to apply an overlay to the existing parking lots. The cost to make this improvement should range from \$739,000 to \$873,000.

Under the high range of USACERL's minimum 100-percent parking scenario, parking related costs decrease to \$719,000 with an increase of building O&M of \$279,000. Chapter 4, **Business Plan Review and Market and Financial Feasibility**, contains a USACERL-developed scenario relative to 100 percent parking, and discusses in greater detail the strengths and weaknesses of such a scenario.

Table 5.5. Surface parking costs (in 1997 dollars).

	AMTL			USACERL Minimum Scenario		USACERL Maximum Scenario	
Project Description	No. of Stalls	Cost (\$)	No. of Stalls	Low (\$)	High (\$)	Low (\$)	High (\$)
<i>Cost Item</i>							
Surface Parking	600	750,000	866	609,000	719,000	739,000	873,000
Total Parking Improvements		750,000		609,000	719,000	739,000	873,000
O&M of buildings (37, 43, 312, and 313)		0		155,000	279,000	155,000	279,000
Remaining Projects		4,235,000		4,930,000	5,422,000	5,504,000	6,126,000
Total Infrastructure Improvements		4,985,000		5,694,000	6,420,000	6,398,000	7,278,000

Building Improvements

The remaining component of infrastructure costs does not directly impact WADC because the responsibility under the development program has been shifted to private sector developers and investors. This component is the renovation cost of the buildings themselves (i.e., what amount of money the developer would spend to bring the buildings to a marketable, functional, and code compliant level). The developer would prefer to invest the least amount possible in terms of fit-up costs to achieve the greatest return on the selling price. Typically, reuse of historic buildings requires renovation and related costs equal to the cost of a new building. Where major restoration is required, these costs can actually exceed the cost of new building space. USACERL analyzed the building improvements for eight buildings (37, 43, 97, 292, 131, 311, 312, and 313) with four considerations in mind:

1. External facade improvements consistent with guidelines outlined in the Memorandum of Agreement for the historical structures
2. Internal demolition of inefficient building space and equipment
3. Tenant fit-up costs to a level that would be reasonable for office, R&D, and specialized manufacturing users
4. A determination of developable square feet.

External facade improvements. During the site visit, USACERL personnel observed and determined the types of repairs that would be required to improve the facades and still comply with the MOA. They concluded that the best repair

scenario was for a water powerwash on the brick. In the reuse application and plan, no specific repair scenario was indicated. Therefore, USACERL used its own observation as the repair scenario.

Internal demolition. To determine possible internal demolition costs, USACERL personnel studied the current building layout from AUTOCAD drawings supplied by the Army Caretaker Force at AMTL. They then determined what walls and mechanical equipment would have to be removed to make the building more efficient and marketable, and then calculated a cost to perform this work. WADC does not give a specific cost estimate for the internal demolition requirements.

Tenant fit-up costs. Of all the building fit-up costs, this is the most difficult to quantify because each tenant has its own space usage and functional preferences. Some of these preferences can be quite expensive. As an average, USACERL made two assumptions. The first assumption is that the building is not handicap accessible and must be modified to comply with applicable American's with Disability Act (ADA) regulations. Fit-up costs in this category include upgrade entrances, restrooms, drinking fountains, door hardware, and signage. USACERL calculated these costs from "The ADA in Practice" and R.S. Means. The second assumption is that each tenant has its own functional preferences for developable space and will modify wall, floor, and ceiling coverings. USACERL believes that the owner should provide these enhancements to facilities based on building space absorption in the market.

Developable square feet. The amount of developable square footage can affect total redevelopment costs and revenues, since both are usually based on dollar per square foot. Since WADC did not provide adequate support for estimated developable square footage, USACERL took measurements off of existing AUTOCAD drawings.

Table 5.6 shows a total of the building fit up costs per type of usage, and Appendix C gives a breakdown by building on how USACERL calculated the building improvement costs.

USACERL findings. In reviewing the infrastructure costs, USACERL found that several buildings will need to be demolished because they are constraining the adaptive reuse plan. The cost analysis performed by WADC did not include Buildings 36, 39, the interior of Building 60, the shed addition on Building 97, the addition on Building 37, and the center wing of Building 313. Including the cost of these buildings will increase the proposed demolition amount of \$1,960,000 to a minimum range of \$2.5 million to \$2.6 million or to a maximum range of \$2.7 million to \$2.8 million.

Table 5.6. Total building improvement costs (in 1997 dollars).

	WADC			USACERL		
		Proposed amount of developable sf	Improvement costs (with 25% contingency) (\$)		Proposed amount of developable sf	Improvement costs (with 25% contingency) (\$)
TOTALS	Personnel			Personnel		
Office space		309,500	20,603,000		272,117	19,533,000
Research and Development space		309,500	20,603,000		272,117	19,533,000
Manufacturing space		0	0		34,505	1,150,000
Total Space	1,706	619,000	41,206,000	1,595	578,740	40,216,000
Office/SF			66.57			71.78
R&D/SF			66.57			71.78
Manufacture/SF						33.33
Total/SF			66.57			69.49

The largest constraint on the redevelopment of the property is parking. As previously discussed, this problem can be approached a number of different ways. The WADC-developed scenario produces just over 1,571 parking spaces at a cost of \$9.8 million just for parking. Parking was divided into 900 parking spaces in two parking garages and 671 spaces in surface parking. However, the Environmental Notification Form (ENF) and the Army Final Environmental Impact Statement (FEIS) constrain the total amount of parking to be considerably less than what is proposed (between 1,150 and 1,300 total parking spaces, respectively). Therefore, USACERL developed an alternative scenario following these environmental guidelines of 1,300 parking spaces. The alternative scenario had 1,380 spaces, with an estimated cost between \$6 million to \$7.1 million just for parking (Table 5.4). This parking was broken up into a parking garage of 640 spaces and surface parking of 740 spaces.

USACERL also developed a minimum parking scenario for using just surface parking. This scenario only had a possibility of 866 parking spaces, as compared with the 600 spaces proposed by WADC. Because this scenario will decrease redevelopment, additional operations and maintenance costs were included in the cost estimate of \$764,000 (\$609,000 plus \$155,000) to \$1,152,000 (\$873,000 plus \$269,000) (see Table 5.5).

When considering all of the proposed infrastructure costs, not all of individual line items compare equally. However, it is the opinion of USACERL that total capital improvement program dollar amounts are reasonable with the AMTL estimate (\$14.1 million) falling between the minimum (\$13.4 million) and the maximum (\$17.2 million) USACERL scenario.

In terms of building fit up, WADC proposed a total of \$41.2 million as fit-up costs for eight buildings: 37, 43, 60, 97, 131, 311, 312, and 313. WADC did not explain the methodology for cost estimates or furnish an adequate level of technical support. USACERL looked at exterior facade improvements to ensure compliance with the MOA, internal demolition to maximize developable space, tenant fit-up costs to provide a minimum acceptable level of improvements based on local markets, and an accurate estimate of developable space. From these eight buildings, USACERL determined that a little over 578,000 square feet of space is developable. USACERL estimates that the cost to rehabilitate this space at \$40.2 million and concludes that this estimate is reasonable.

6 Extent of State and Local Investment and Risk

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Background

Local investment in the redevelopment of AMTL will involve significant costs including high capital expenditures, the majority of which arise from a lack of sufficient parking supply to support proposed commercial uses. Page 20 of the WADC EDC application estimates development costs of \$16.8 million for fiscal years 1997 through 2003. The \$8.45 million gap between real property disposition and anticipated costs is scheduled to be met through a combination of sources, including Economic Development Administration Grants for fiscal years 1997 and 1998, a Public Works and Economic Development Grant, a Community Development Action Grant, and Development Bonds secured by local taxes (EDC Application, p 18). In addition to this substantial financial commitment by Watertown, the Commonwealth, and the Federal Government, the WADC has adopted a comprehensive reuse plan for the former Watertown Arsenal, which serves as the primary guide for redevelopment (Watertown 1997).

Approach

USACERL will discuss the extent of state and local investment risk associated with the redevelopment of AMTL, as well as the ability of WADC to implement the reuse plan as proposed in the EDC application. This discussion will be made through the systematic evaluation of proposed investment, which is required for

job creation and investment risk based on the following evaluation categories: (1) economic, (2) political and organizational, and (3) environmental.

Investment

Chapter 5, **Need and Extent of Infrastructure Improvements**, provides an in-depth discussion of the proposed capital improvements provided in the EDC application and reflected in the business plan pro forma. To summarize, WADC proposes the following:

- \$9 million in parking garage improvements
- \$4.4 million in on-site improvements to include building demolition, surface parking, and utility systems upgrades
- \$570,000 in off-site traffic and road improvements.

The total proposed capital improvement plan indicated approximately \$14.8 million in improvements in addition to \$2 million in operating costs.

USACERL finds that some of these proposed investments are overstated. WADC articulates a requirement for two parking garages, which would satisfy a 900 parking space deficit at a total cost of \$9 million. When proposed surface parking is added, a total of 1,500 parking spaces would be available for the end users located in the EDC parcel. However, USACERL estimates parking structure costs to be \$7.7 million.

Moreover, actual parking structure requirements may be overstated. Appendix D of the EDC application package contains the Watertown Arsenal Reuse Environmental Notification Form (ENF) which serves as a guidance document for the Massachusetts Department of Environmental Protection (MDEP) for such things as permitting and environmental impact reports. Although the ENF states a need for structured parking, total parking requirements are capped at 1,150 spaces versus WADC's 1,500 due to the potential adverse environmental and traffic impacts that could be realized through greater site trip generation.

Additionally, page 5-22 of the Army FEIS supports the ENF recommendation by developing a ceiling of 1,300 on-site parking spaces under the high intensity reuse (HIR) scenario (USAMC 1995). It is clear from both the ENF and FEIS that WADC's proposed level of parking may be overstated due to the adverse impacts on the environment and local road networks. However, USACERL finds that at least one parking deck, or two of a lesser size, would be necessary to spur job creation in the short timeframe set out by WADC.

USACERL finds the timing and need for proposed improvements to be reasonable, prudent, and consistent with the development goals and objectives of the reuse plan. For example, the 100 percent public sector investment in parking garage #1 in the second and third years of the planning horizon is reasonable when current regional parking shortages are factored with current market demand for the reusable buildings at AMTL. Postponing construction of the garage(s) until market conditions warrant private sector leveraging would most likely extend the sales of buildings beyond 6 years and would justify further discounts on current land and building values. All other capital improvements were found to fall within USACERL's developed cost range of reasonableness necessary to spur job creation.

Investment Structure

Three paths are available to pursue possible construction and operation of the site's structured parking facility. The first choice maintains that the LRA solely provide necessary parking. The next two, sole private sector and joint public/private sector funding, are similar in impact and complexity.

Sole or joint private sector ownership of the structured parking has the advantage of reducing the government's funding obligation. In addition, the recent surge of privatization of public facilities and operations suggest the private sector can more efficiently offer necessary on-site amenities or personal services than resource limited governmental units. However, this is not always the case. Arguments opposing private sector involvement are compelling for a number of reasons.

First, costs associated with contract negotiation, joint operations and maintenance management, and exit barriers make privatized construction (either wholly or in combination with the LRA) impractical. Moreover, adversarial relationships that prevail in private sector contractual arrangements will likely result in construction delays and inadequate maintenance provision. Agency conflicts, with regard to construction quality, will motivate private developers to construct and operate a structured facility more with short-term profitability in mind than safety and durability. Partial private sector development and management may be an acceptable alternative, but only if the city assumes operations and maintenance responsibility and eventual ownership of the structure. The most compelling argument against private sector involvement speaks to the primary objectives of the EDC process—job creation and local economic growth. Sole private sector and joint private/public sector development

cannot satisfy these objectives as well as sole LRA redevelopment due to welfare loss, which is defined as shortfalls of job and tax base creation.

Risk

Economic Risk

Two important categories of economic risk include financial and market risk. Financial risk, defined as the likelihood that the LRA will be able to meet its debt obligations from projected revenue sources, appears to be moderate given the forecasted timing of the cash flows, which includes the sale of the individual buildings. The LRA intends to cover most of the development-related costs with an array of grants, and the limited fund shortfall is projected to be addressed through short-term bridge loans collateralized by the unsold buildings. The estimated need for this type of financing is at \$1.5 million. The initial line of credit for \$531,000 is expected to be fully repaid concurrently with the sale of Building 311 in 1997. Additionally, the Town of Watertown could potentially realize a yearly net fiscal impact of \$1.3 million from real estate taxes assessed at AMTL. To the extent that the sought grant funding and building sales takes place according to the LRA's expectations, the financial risk exposure should be low relative to the overall value of the investment.

Much of the economic risk rests upon the strength of the market and the investment's ability to achieve or exceed the projected levels of revenues and occupancy. From the discussion on the general market conditions surrounding AMTL, it seems that projected rent and occupancy cost levels will be able to support the values as presented in Chapter 4, **Business Plan Review and Market and Financial Feasibility Analysis**. This conclusion is consistent with and reflective of the industry data examined regarding the outlook of this market. While USACERL cannot make any strong predictions on market conditions, the short-period investment horizon as set out by the LRA does allow for a lower degree of uncertainty. WADC's on- and off-site capital improvements, especially the provision of adequate on-site parking at no cost, provide very attractive incentives for developers and investors to locate at the former Watertown Arsenal. This level of public investment enjoys widespread public support, fosters a development climate that is stable and attractive to developers and financial institutions, and allows the proposed development to be competitive with other submarkets such as Cambridge. In the absence of a concerted capital investment program by WADC, absorption, rental, and sales rates would be negatively affected, but to what extent is uncertain.

With WADC's investment commitments and a regional economy driven by the most rapidly growing industries—those related to computer technologies and ancillary services—Watertown and the surrounding areas are not likely to suffer from a major economic downturn in the foreseeable future.

Political and Organizational Risk

As affected by government actions and those of the LRA, the overall level of risk in the conveyance of AMTL is perceived to be moderate to low. However, this type of risk could be further reduced through active involvement of a public economic development organization such as the Massachusetts Development Finance Agency, which has successfully assisted other Commonwealth clients such as municipalities, institutions, businesses, manufacturers, and Fort Devens. Their programs include bond financing, large-scale development projects, marketing, technical assistance, redevelopment assistance funding, and others. AMTL has made use of their services, but apparently only for bridge financing.

Environmental Risks

The potential for this category of risk appears to be relatively high in the face of extensive studies and reports performed by the U.S. Army Corps of Engineers. The LRA reports that any out of the ordinary, currently detected, environmentally troubling issues (such as lead-based paint and asbestos abatement) are projected to be resolved by the scheduled conveyance date of each reusable building. Based on past experience, however, USACERL believes that environmental remediation timelines are often prone to unforeseen contingencies and, as such, should be appropriately considered when negotiating with WADC. USACERL developed an alternative financial feasibility scenario around the possibility of environmental encumbrances to address this issue in Chapter 4, **Business Plan Review and Market and Financial Feasibility**.

Another possible source of environmentally related issues may be the degree of compliance by the LRA with MDEP standards in terms of the allowable development intensity. That is, there is a potential likelihood that MDEP might not grant the LRA the necessary permit to conduct the level of development as proposed in the Reuse Plan Update EDC application. This assertion is primarily supported by the maximum allowable parking spaces and average daily trips presented under the HIR scenario in the ENF and Army FEIS.

The possibility of the State Historic Preservation Officer (SHPO) restricting the amount of infrastructure and other related development (i.e., parking, exterior fit-ups, etc.) might occur because of cultural resource considerations. These issues are not quantifiable at this point, but serve merely to demonstrate possible constraints on proposed development.

It is important to note that political and organizational risks increase as more surface parking is substituted for structured parking. The main argument supporting a 100-percent surface parking scenario is for reduced construction costs associated with surface parking. Yet, after considering barriers impeding a 100-percent surface parking scenario, USACERL concludes such a scenario is impractical.

Conclusion

USACERL concludes that WADC has devoted a considerable amount of effort to the necessary planning and development of the critical financing plan for the redevelopment effort. While the risks associated with any real estate development of this magnitude are typical, WADC has demonstrated the financial wherewithal and consideration of the critical elements of risk to successfully redevelop AMTL.

7 Local and Regional Real Estate Market Conditions

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Methodology

Local and regional residential, office, and industrial real estate market data were gathered and compared to real estate market information given in the AMTL EDC application and Reuse Plan. Real estate market data were collected from a variety of sources including real estate research firms, Urban Land Institute "Market Profiles," government studies conducted in conjunction with base realignment and closure (BRAC) initiatives, and various other market sources. Independently gathered data were used, in part, to confirm or dispute claims made in the EDC application and reuse plan related to real estate conditions, impacts due to base closure, and anticipated economic redevelopment from an EDC.

Background

AMTL is in the town of Watertown, about 7 miles west of downtown Boston and adjacent to Cambridge, in a highly urbanized area beside the Charles River. Figure 2 shows the geographical relationship between Watertown, the Greater Boston urban area (including Cambridge), and major transportation corridors.

Site Configuration

The entire AMTL facility has a footprint of about 47 acres, although about 17 of these acres will be used for public benefit purposes. The Massachusetts School

of Professional Psychology has requested Building 131 for public benefit educational purposes, but the Department of Education has withdrawn its support for conveyance of the facility at the time of this analysis (please refer to Chapter 3, **Consistency of the EDC Application With the Overall Redevelopment Plan**). The remaining 27-acre parcel, which includes 13 existing buildings, 8 of which will be reused, offering about 578,000 sq ft of developable space, is the subject of the EDC application.*

The AMTL facility occupies a low bluff overlooking the Charles River, and is bordered by Arsenal Street on the north, and North Beacon Street on the south. Arsenal Street provides primary traffic access with one curb cut (three are proposed), and also serves surrounding commercial and industrial land uses, including Arsenal Mall (106 stores) and the Watertown Mall (138 stores).† North Beacon Street provides secondary access and serves the surrounding Arsenal Park, MDC park land along the Charles River, and a residential neighborhood to the west. Talcot Avenue borders the facility to the east, and separates it from a residential area and Arsenal Park.

The site also offers prime regional transportation access. In addition to the direct access to area arterials, the site also has vehicular access to the I-90/Massachusetts Turnpike by way of Galen Street. The site is also served by two public bus lines and compares favorably with more distant suburban sites (see Figure 1).

Regional Markets

The AMTL facility is midway between the urban markets of Cambridge and central-suburban Boston and the Route 128/Massachusetts Turnpike market, which includes Newton, Waltham, Weston, and Wellesley (see boxed area in Figure 2).

Although the EDC application conservatively suggests that much of the demand for AMTL facilities would come directly from coterminous areas, USACERL has determined that significant demand may come from the larger regional market areas, including the directly neighboring Cambridge and Boston markets. As

* Several possible reuse scenarios have been considered; however, the February 1997 reuse plan (p 18) suggests that the preferred scenario will result in "approximately 560,000 square feet of space in 11 major buildings." Other scenarios are outlined on p 4.

† A site configuration map is provided in the introductory section of this review.

will be discussed, the Greater Boston area is currently experiencing a shortage of space for both office and industrial uses, particularly for users needing more than 20,000 sq ft. Although new construction is on the horizon, current rental rates have not matured to levels that will support large-scale construction, except for users that are interested in build-to-suit developments. Additionally, the Massachusetts permitting procedure for new construction can be lengthy. Since AMTL is one of the few facilities that can provide large-scale commercial and industrial space in the short term, and is relatively near the Cambridge and Greater Boston markets (about 6 miles), it appears likely that AMTL may attract tenants from these areas.

Planned Uses

The AMTL reuse plan positions the facility primarily for office and light industrial use with an emphasis on R&D and specialized light manufacturing. Accordingly, the focus of this analysis has been on office and industrial uses.

Office Market Conditions

The Greater Boston office market, including the regional submarkets surrounding AMTL, has thoroughly rebounded from the overbuilt recessionary market of the early 1990s. Although new construction has yet to heat to prerecession levels, sales and leasing activity have been extremely strong, driving the overall vacancy rate for office uses down to a record level of about 7 percent, which is the lowest rate the Greater Boston area has experienced in more than 10 years. Forecasts predict that this rate will continue to drop into the 5 percent range during 1997. Recent demand for office space has been so strong, in fact, that the Greater Boston market has been rated the "fifth-strongest commercial market in the country" by the real estate firm Cushman & Wakefield (1996). Other real estate firms, including First American Financial Corp., have placed Greater Boston on their "best markets" list.

Rental/Lease Market

Rental market conditions in both the suburban areas and the Boston Central Business District (CBD) have shifted from a market that favored tenants to one that favors landlords. Rental rates are now approaching \$32.00 per square foot (gross) for office space in the CBD, while rates are about \$23.50 per square foot (gross) for suburban space. Similarly, leasing concessions like free rent and facility improvements have all but disappeared.

Absorption rates have also been positive. Net absorption for 1996 was over 1.7 million sq ft, an improvement over the 1 million sq ft absorbed in 1995 and lesser rates in 1994 and 1993. Table 7.1 shows absorption in the suburban office market (AMTL is located within the 128/Mass Pike submarket). Note that even these absorption rates are incomplete, because tenants seeking large-scale space have been partially locked out of the market because of a lack of large spaces (Grubb and Ellis 1996).

Table 7.1. Office absorption and vacancy rates for 1996.

Market	1996 Absorption (sq ft)	4 th Qtr Absorption (sq ft)	Vacancy Rate (%)
Greater Boston	1,704,579	(38,738)	5.1
Boston	1,612,766	700,068	5.2
Cambridge summary	181,273	(20,441)	1.8
Suburbs summary	(89,460)	(718,365)	5.6
128/Mass Pike	540,917	(52,301)	2.6

(Source: Spaulding & Slye Colliers 1997.)

Construction Market

Momentum is building in the office construction market, although an emphasis on being "demand-driven," rather than "capital-driven," is keeping it from heating to the pace of the late 1980s. Currently, no new large-scale buildings have been released to the CBD market since 1992, when the vacancy rate was 17.1 percent. Since new CBD developments require rents of about \$30.00 per square foot NNN (which calculates to a gross rent of \$40.00 "plus"), achieved rents in the mid- to high \$30s are necessary to support speculative building. Furthermore, the lengthy Massachusetts permitting procedure, along with the simple logistics of building large-scale office facilities, dictates that significant supply will not enter the market for at least 3 years. No large-scale ground breaking in the CBD is currently imminent.

The state of the construction market in the suburbs is similar. Although two small developer-funded office projects totaling 96,300 sq ft have been delivered, maturing office rental rates have not yet developed to the point where they will support speculative construction.

Because of the state of the new construction market, most of the new space being placed on the market has come from conversions of existing buildings (turnover accounts for the rest). For example, one renovated building in the CBD, which placed 250,000 sq ft of space on the market last year, was fully leased in several months. Several other large-scale conversions are taking place in the Boston CBD, some of which are already partially leased. Buildings like

these will likely continue to provide some additional space, until new construction begins.

The other trend in the construction market is renewed interest in build-to-suit office space. More than 500,000 sq ft of space has already been scheduled for delivery in 1997 in suburban areas, and developers report that more than 5 million sq ft have been accounted for in outstanding proposals.

Industrial Market Conditions

Like the office market, the Greater Boston industrial market has steadily recovered from the glut of overbuilding that occurred in the late 1980s, to a point where absorption and rental rates are similar to those present in 1985-1986. Demand for high technology space has been especially strong, to the point that some northern and western areas are now termed "Silicon Valley East." Average vacancy rates for industrial uses have fallen from a 1994 high of about 21 percent to about 18 percent in 1995 and 12 percent in 1996. Forecasts predict that this reduction will continue and level off at about 9 percent, as new construction ramps up to meet growing demand.

The industrial market is also experiencing the same general large-scale supply problem as the office market. In particular, there are few options for manufacturing users needing more than 150,000 sq ft and clear heights of 22 ft or more. R&D users requiring in excess of 50,000 sq ft are similarly limited to facilities located in less desirable areas. Thus, interest in build-to-suits has been strong.

Research and Development

Like demand for office space, Boston area R&D demand has been growing since the regional economy began rebounding several years ago. In fact, lack of space in some areas has been so severe that companies desiring space in the CBD or Cambridge areas have been forced to accept leases in more suburban areas, including AMTL's 128/Mass Pike submarket.

Continued strong demand in the overall market has pushed absorption and rental rates to levels similar to those of the mid-80s. Specifically, the overall absorption rate in 1996 was about 2.2 million sq ft, which is a decline of 30 percent from 1995 levels. Similar average absorption rates are projected for 1997 and 1998 (see Table 7.2). Average rental rates also rose some 11 percent from 1995 levels to about \$8.44 overall in 1996, although even higher rates of

between \$9.49 NNN and \$12.23 NNN have been observed in the 128/Mass Pike submarket.

Table 7.2. R & D absorption and vacancy rates for 1996.

Market	1996 Absorption (sq ft)	4 th Qtr Absorption (sq ft)	Vacancy Rate (%)
Greater Boston	1,257,419	66,163	8.4
Cambridge	56,965	(5,000)	1.6
Suburbs	1,200,454	71,163	8.5
128/Mass Pike	160,436	10,000	5.3

Because this market, like the office and the manufacturing market, also suffers from a lack of high-quality space, it should experience continued growth over the coming years. The long lead times associated with build-to-suit projects also mean that retrofitting will continue to be a primary method of satisfying space needs until rental rates increase to the point where they can support speculative development.

Manufacturing and Warehousing

Manufacturing activity in the Boston area stabilized in 1995 and has been steadily increasing, partially because of a rebounding post-recession economy and partially because of a new Massachusetts tax law that only taxes state manufacturers on in-state sales activity. Although activity in this market sector has not been as frantic as the R&D and office sectors, overall combined vacancy rates for the manufacturing sector have dropped 3 percent in 1996, to 12.3 percent; the decline in 1995 was about 5.3 percent (see Table 7.3) (Grubb & Ellis 1996).

Like the R&D market, interest in leased manufacturing facilities has been particularly concentrated in the north along the I-495 corridor, and in the south along Route 128. Rents in these areas have gradually edged upward towards \$5.00 per square foot NNN. As with the R&D market, observed rents in the 128/Mass Pike corridor have been higher, averaging \$7.58 per square foot NNN. Absorption rates have been relatively flat, holding steady at 1995 levels.

Table 7.3. Industrial absorption and vacancy rates for 1996.

Market	1996 Absorption (sq ft)	4th Qtr Absorption (sq ft)	Vacancy Rate (%)
Greater Boston	16,832	(719,392)	15
Cambridge	25,000	0	17.3
Suburbs	(8,168)	(719,392)	15
128/Mass Pike	24,801	10,500	7.9

Purchases of manufacturing facilities have also been on the rise, particularly in the northern and western submarkets. Recent sales prices in these areas have ranged from \$41 to \$49 per square foot (Cushman and Wakefield 1996).

The manufacturing market, like the office market, has also been trending toward redevelopment of older facilities. Although this is more of an issue for manufacturing uses, because of greater functional obsolescence in older buildings, it will likely remain a primary method of delivering usable space into the market quickly, and at lower costs than would be the case with new construction. Interest in build-to-suits has also been strong, paralleling the office market.

8 Army Disposal Plan, Other Federal Agency Concerns, and Other Property Disposal Authorities

As part of the EDC application review process adopted by the BRAC office at HQUSACE and presented at the Corps of Engineers Real Estate Workshop in Denver, CO, in December 1995, USACERL has been asked to defer comment on these issues to the Real Estate Directorate at HQUSACE and the Corps of Engineers District, Baltimore. In addition, both the negotiation process leading up to the submittal of the formal EDC application and review of the legal environment related to real and personal property disposal are beyond the scope of USACERL's technical review.

Future EDC reviews will continue to explore these issues insofar as they pertain to other elements of the technical review. Summaries of USACERL's findings on these matters will be documented when appropriate and when requested by Army decisionmakers.

9 Economic Benefit to the Federal Government

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Introduction

One of the criteria for EDC applicant eligibility that may be considered by the military department is the economic benefit to the Federal Government that will be derived from the proposed EDC. The military department is asked to consider the protection and maintenance cost savings that would be avoided by a swift conveyance of the EDC parcel, as well as the anticipated consideration from the transfer. In accordance with this DoD requirement, USACERL determined one-time facility layaway as estimated by the Army to be \$2.2 million, while recurring annual operations, maintenance, and repair cost is estimated at \$1.0 million.

USACERL's evaluation and analysis estimates the values of the business plan to be approximately \$3.3 million to \$5.3 million. In the EDC application for AMTL, WADC estimates the fair market value of the property at \$0 based on the results of their business plan's cash flow analysis (WADC 1997, p 25). WADC's application outlines their proposal to the Army as follows:

EDC approval should allow a quicker turnover of the property with much greater surety as to successful transfer and development. The State and Town commitments of funding will enable implementation of the full Reuse Plan and successful creation of 1,300 to 1,700 jobs. Transfer in September 1997 will eliminate Army care and maintenance costs, budgeted at \$578,000 for Fiscal Year 1997. Sale on the private market could delay that transfer for several months.

Due to the need for substantial public subsidy for full development of the site, the traffic limitations on allowable development and the Memorandum of Agreement requirements to preserve the Arsenal's historic buildings, private developers will be reluctant to buy the entire site. In purchasing the site, a developer could not be assured of public financing to subsidize the cost of structured parking. EDA funding is not available to private developers. Failure to sell the entire property could leave the Army with long-term ownership of a portion of the site, imposing long-term care and maintenance obligations to preserve historic structures which cannot be developed due to development constraints. (WADC 1997, p 30)

Layaway and Annual M&R Cost Savings

Without a timely conveyance of the AMTL EDC parcel, the Army is faced with continuing caretaker services of the vacated arsenal until a future conveyance. USACERL used the 1 July 1994 Army Memorandum furnished by the AMTL Army Caretaker Force to estimate one-time facility layaway costs. USACERL determined that these budget figures were reasonable and accurate; therefore, an independent cost estimation analysis was not needed. Based on the budget figures provided in the Memorandum, one-time facility layaway costs incurred by the Army are estimated at \$2,219,500. The breakdown is provided in Table 9.1. Similarly, recurring operations, maintenance, and repair costs are estimated at \$1,093,500. Table 9.2 contains the cost breakdown for annual operations, repair, and maintenance.

It is USACERL's understanding that the costs outlined in the Army Memorandum and summarized in Tables 9.1 and 9.2 are associated with all buildings. USACERL concludes that the Army should consider an annual operations, maintenance, and repair cost avoidance for AMTL when deciding the eligibility of the EDC applicant.

Anticipated Consideration From the Conveyance

WADC estimates the fair market value of the AMTL EDC parcel to be \$0. WADC projects approximately \$1,992,600 in operating costs and \$14,785,700 in capital improvements from approximately \$16,790,000 in revenues over the 6-yr development timetable. Therefore, the applicant claims that all real property within the EDC parcel should be conveyed without consideration to the Army. Based on the technical findings demonstrated in Chapter 4, **Business Plan**

Review and Market and Financial Feasibility, USACERL finds that the proposed consideration to the Army is inadequate for the following reasons:

1. Although all proposed capital improvements were found to be uniquely and specifically attributable to the redevelopment of AMTL, meaning that on-site end-users would be the primary beneficiaries of such investments, WADC's claim that \$9,000,000 must be invested into two parking garages is most likely overstated. First, under the low USACERL-developed minimum scenario, parking structure costs were estimated at \$8,000,000, suggesting that WADC's cost estimates are overstated. More importantly, USACERL found evidence in both the Massachusetts Environmental Notification Form (ENF) and Army Final Environmental Impact Statement (EIS) for reduced on-site parking requirements. Parking was capped at ceilings of 1,150 and 1,300 respectively in the ENF and EIS due to the attendant negative environmental and traffic impacts associated with high-intensity traffic and parking generation. Under the reduced parking requirement scenario, USACERL calculates parking structure costs to be \$6.4 million.
2. WADC's projected revenues from the sale of eight reusable buildings is wholly unsupported in USACERL's opinion. The methodology adopted by the applicant to estimate building residual value uses a mixture of the sales comparison and residual land value approaches. Although these valuation techniques are appraisal industry standard, the results of their application to the WADC business plan are not defensible. First, WADC makes use of sales comparisons located well outside the relevant AMTL real estate submarket to determine a price per square foot based on proposed building reuse. The markets in which sales comparisons were derived tend to be suburban in nature and of unrelated building uses. Therefore, sales rates are not reflective of the current strength and growth of the Boston, Cambridge, and Mass Pike/Route 128 real estate submarkets. Second, residual land value methodology depends on sound rental and vacancy rates, operating expenses, and capital improvement costs to calculate the value of a given property. The rates and estimates used by WADC to determine residual value were not well supported and in some cases not reflective of current real estate conditions or the development incentives WADC will offer to developers (e.g., free structured parking). USACERL developed a total value for all building sales of \$11.7 million versus WADC's \$8.35 million.

Based on the above findings, USACERL estimates a range of net present value of \$3.3 to \$5.3 million. The low end of the estimated range reflects USACERL-developed building sales, WADC's full capital improvement program, and an 11

percent discount rate. Alternatively, USACERL's high range of estimated net present value is based again on USACERL-developed building sales, but also reflects reduced structured parking requirements and a 6 percent discount rate.

Furthermore, based on the eligibility criteria reviewed in this report, it is the opinion of USACERL that the applicant is eligible for an EDC. The Army's final determination of value and possible consideration from WADC will be contingent upon the results of the negotiation process and the Army's Fair Market Value appraisal results.

Table 9.1. AMTL estimated one-time facility layaway costs.

One-Time Layaway Costs	
<i>Item</i>	<i>Cost</i>
Personnel	
Facilities Engineering Personnel	\$428,000
BRAC Personnel	\$110,000
Security	\$420,000
Environmental Personnel	\$235,000
Supply Personnel	\$76,000
BTC personnel	\$162,000
Utilities	
Electricity	\$35,000
Water/Sewer	\$10,000
Natural Gas	\$100,000
Fuel Oil	\$5,000
Contracts	
Environmental permits	\$0
Snow Plowing	\$5,000
Grounds	\$5,000
Building Envelope Maintenance	\$5,000
Piping Maintenance	\$5,000
Custodial	\$5,000
Sprinkler	\$0
Fire Alarm	\$0
Refuse	\$5,000
HVAC	\$2,500
Miscellaneous	\$5,000
Other	
Supplies	\$35,000
One-time supplies	\$75,000
Historical	
Layaway Building 111	\$340,000
Layaway costs - Other	
BRAC Personnel	\$15,000
Security	\$12,500
Environmental Personnel	\$86,000
Supply Personnel	\$5,000
BTC personnel	\$32,500
Total	\$2,219,500

Table 9.2. AMTL estimated annual operations, maintenance, and repair costs.

Annual Layaway Costs	
<i>Item</i>	<i>Cost</i>
Personnel	
Facilities Engineering Personnel	\$278,000
BRAC Personnel	\$0
Security	\$315,000
Environmental Personnel	\$0
Supply Personnel	\$76,000
BTC personnel	\$162,000
Utilities	
Electricity	\$10,000
Water/Sewer	\$6,000
Natural Gas	\$100,000
Fuel Oil	\$5,000
Contracts	
Environmental permits	\$15,000
Snow Plowing	\$10,000
Grounds	\$5,000
Building Envelope Maintenance	\$5,000
Piping Maintenance	\$5,000
Custodial	\$2,500
Sprinkler	\$5,000
Fire Alarm	\$5,000
Refuse	\$3,000
HVAC	\$2,500
Miscellaneous	\$3,000
Other	
Supplies	\$20,000
One-time supplies	\$0
Historical	
Layaway Building 111	\$15,000
Layaway costs - Other	
BRAC Personnel	\$0
Security	\$10,000
Environmental Personnel	\$0
Supply Personnel	\$3,000
BTC personnel	\$32,500
Total	\$1,093,500

10 Review of Application for Completeness

This chapter summarizes USACERL's review of the WADC EDC for completeness as required by 32 CFR Part 91.7(e)(5). The content of the requirements are listed below in italics, followed by USACERL's findings.

1. *Copy of the adopted Reuse Plan.* A copy of the plan is included.
2. *Project narrative, including:*
 - a. *General description of the property requested.* A description is provided but lacks depth or quality in terms of specific data about AMTL buildings. Due to inaccuracies and contradictions in this information, USACERL spent a considerable amount of time and effort in attempting to validate and reconcile installation real property data.
 - b. *Description of intended uses.* A description is provided.
 - c. *Description of the economic impact of the closure on local communities.* A minimally acceptable description is provided, although gaps in relevant source data concerning the fiscal outlay of the AMTL facility during the year of closure complicated USACERL's technical review.
 - d. *Description of the financial condition of the community.* A descriptive market analysis is included in WADC referenced materials.
 - e. *Statement of how the EDC is consistent with the overall Reuse Plan.* The application provides a short discussion of consistency with the adopted Reuse Plan.
3. *Description of how the EDC will contribute to short- and long-term job creation and economic redevelopment.* A short discussion is provided but was limited in that its conclusions were unsupported by referenced material or source data. Although USACERL was able to develop an alternative review methodology, it suggests that WADC supplement the application with

available source data and a description of the methodology used to develop its economic impact conclusions.

4. *Business and development plan for the EDC parcel, including:*

- a. *Development plan, timetable, phasing plan and cash flow analysis*
- b. *Market and financial feasibility analysis*
- c. *Cost estimate or justification for infrastructure and other investments needed for development of the EDC parcel*
- d. *Local investment and proposed financing strategies for the development.*

Elements 4(a) and (d) are provided in the application and are adequately supported by the EDC application and other referenced reports. However, element 4(b) is deficient as WADC inadequately supports the relationship between current real estate market conditions and AMTL residual building values. Building residuals account for 50 percent of WADC's project revenue stream, and as such, should contain the appropriate amount of technical support in terms of market rental, sales, and capitalization rates. In addition, accurate developable square feet and a reasonable range of technically supported building fit-up costs should have been included for each reusable building. Likewise, element 4(c) was inadequately supported in terms of parking structure need. WADC does not consider the potential constraints that may be imposed by the Massachusetts Department of Environmental Protection relative to off-site environmental and traffic impacts generated by a high intensity reuse of AMTL.

5. *Statement describing why other authorities - such as negotiated or public sale cannot be used to accomplish the economic development and job-creation goals. A statement is provided.*
6. *If a transfer is requested for less than fair market value...then a statement should be provided justifying a discount. The applicant argues that the fair market value of the EDC parcel is less than \$0 (negative \$8.45 million) and thus does not attempt to argue for a discount from fair market value.*

Statement of the LRA's legal authority to acquire and dispose of the property. A statement of legal authority is provided.

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Appendix A: Massachusetts Economic Multipliers

Table A1. Massachusetts economic multipliers.

Massachusetts Economic Multipliers from RIMS II '90						
	Final-Demand Multipliers			Direct-Effect Multipliers		
	Total Output for Δ Demand	Household Earnings for Δ Demand	Δ Employment for Δ Demand	Earnings for Δ Earnings	Employment for Δ Employment	
Office Uses:						
Finance	2.1218	0.7434	26.7	2.0218	2.3908	
Insurance	2.6957	0.9803	36.3	2.4225	2.7698	
Real Estate	1.3386	0.1224	4.8	5.7349	6.1320	
<i>Office Use Average:</i>	<i>2.0520</i>	<i>0.6154</i>	<i>22.6</i>	<i>3.3931</i>	<i>3.7642</i>	
Industrial Uses:						
Machinery (Except Electrical)	2.2447	0.6811	23.0	2.3496	2.9522	
Electric & Electronic Equipment	2.2693	0.7309	25.9	2.2010	2.5581	
Instruments & Related Products	2.0500	0.6256	22.0	2.1161	2.5294	
Miscellaneous Manufacturing Industries	1.9267	0.4770	19.8	2.4225	2.3360	
<i>Manufacturing Average:</i>	<i>2.1227</i>	<i>0.6287</i>	<i>22.7</i>	<i>2.2723</i>	<i>2.5939</i>	
Overall Averages	2.0874	0.6220	22.6	2.8327	3.1791	

Appendix B: Pro Forma Analyses

Table B1. Discounted Cash Flow Analysis. WADC Business Plan.

Army Materials Technology Laboratory **Discounted Cash Flow Analysis**

Scenario: WADC Business Plan

	1997	1998	1999	2000	2001	2002
1 Land Sales Revenues						
2 Building 311	0	3,050,000	0	0	0	
3 Building 131	0	861,000	0	0	0	
4 Building 312	0	0	811,000	0	0	
5 Building 37	0	0	0	876,000	0	
6 Building 313	0	0	0	1,087,000	0	
7 Building 43	0	0	0	0	709,000	
8 Building 292	0	0	0	0	440,000	
9 Building 97	0	0	0	0	258,000	
10 Building 60	0	0	0	0	263,000	
11 Total Revenues	0	3,911,000	811,000	1,963,000	1,670,000	
12						
13 Grant/Loan Revenues						
14 Economic Development Administration Grants	1,500,000	1,500,000	0	0	0	
15 Public Works and Economic Development Grant	0	2,000,000	0	0	0	
16 Community Development Action Grant	0	1,000,000	0	0	0	
17 Development Bonds Secured by Town Taxes	0	0	0	2,450,000	0	
18 Mass Development Line of Credit	144,000	(144,000)	0	0	0	
19 Mass Development Bridge Loan	0	0	250,000	(265,000)	0	
20 Total Grant/Loan Revenues	1,644,000	4,356,000	250,000	2,185,000	0	
21						
22 TOTAL REVENUES	1,644,000	8,267,000	1,061,000	4,148,000	1,670,000	
23						
24 Demolition						
25 Building 36	0	500,000	0	0	0	
26 Building 313C	0	0	0	0	0	
27 Building 37 (shed)	0	0	0	0	0	
28 Building 60	0	250,000	0	0	0	
29 Building 39 (addition)	0	0	0	0	0	
30 Building 39 (main building)	0	1,211,000	0	0	0	
31 Subtotal	0	1,961,000	0	0	0	
32						
33 On-Site Improvements						
34 Water	0	114,100	0	0	0	
35 Sewer	0	103,800	0	0	0	
36 Drainage	0	238,900	0	0	0	
37 Gas Distribution	0	129,800	0	0	0	
38 Electric	0	321,700	0	0	0	
39 Communications Distribution	0	103,800	0	0	0	
40 Roadways	0	207,600	0	0	0	
41 Public Spaces and Plaza	0	0	537,600	0	0	
42 Subtotal	0	1,219,700	537,600	0	0	
43						
44 Parking						
45 Surface						
46 First Phase	0	0	650,100	0	0	
47 Second Phase	0	0	0	0	140,700	
48 Garage #1	0	1,854,000	2,808,000	0	0	
49 Garage #2	0	0	0	2,005,400	3,037,200	
50 Subtotal	0	1,854,000	3,458,100	2,005,400	3,177,900	
51						
52 Off-Site Improvements						
53 Traffic Signals	0	0	260,000	0	0	
54 Traffic Corridor Enhancements	0	156,000	156,000	0	0	
55 Subtotal	0	156,000	416,000	0	0	
56						
58						
59 Operating Costs						
60 Project Staff	9,500	73,800	76,800	53,000	41,400	14,000
61 Fringe Benefits	2,500	18,600	19,200	13,400	10,800	3,600
62 Mass Development Reimbursement	0	0	0	0	0	
63 Office Costs	0	0	0	0	0	
64 Start-Up Costs	0	5,000	0	0	0	
65 Monthly Costs	0	12,000	12,600	13,200	13,800	4,800
66 Marketing Materials & Advertising	0	0	0	0	0	
67 Start-Up Costs	0	40,000	0	0	0	
68 Monthly Costs	0	12,000	12,600	13,200	11,400	

Table B1. Discounted Cash Flow Analysis. WADC Business Plan.

Army Materials Technology Laboratory **Discounted Cash Flow Analysis**

Scenario: WADC Business Plan

	1997	1998	1999	2000	2001	2002
1 Land Sales Revenues						
2 Building 311	0	3,050,000	0	0	0	
3 Building 131	0	861,000	0	0	0	
4 Building 312	0	0	811,000	0	0	
5 Building 37	0	0	0	876,000	0	
6 Building 313	0	0	0	1,087,000	0	
7 Building 43	0	0	0	0	709,000	
8 Building 292	0	0	0	0	440,000	
9 Building 97	0	0	0	0	258,000	
10 Building 60	0	0	0	0	263,000	
11 Total Revenues	0	3,911,000	811,000	1,963,000	1,670,000	
12						
13 Grant/Loan Revenues						
14 Economic Development Administration Grants	1,500,000	1,500,000	0	0	0	
15 Public Works and Economic Development Grant	0	2,000,000	0	0	0	
16 Community Development Action Grant	0	1,000,000	0	0	0	
17 Development Bonds Secured by Town Taxes	0	0	0	2,450,000	0	
18 Mass Development Line of Credit	144,000	(144,000)	0	0	0	
19 Mass Development Bridge Loan	0	0	250,000	(265,000)	0	
20 Total Grant/Loan Revenues	1,644,000	4,356,000	250,000	2,185,000	0	
21						
22 TOTAL REVENUES	1,644,000	8,267,000	1,061,000	4,148,000	1,670,000	
23						
24 Demolition						
25 Building 36	0	500,000	0	0	0	
26 Building 313C	0	0	0	0	0	
27 Building 37 (shed)	0	0	0	0	0	
28 Building 60	0	250,000	0	0	0	
29 Building 39 (addition)	0	0	0	0	0	
30 Building 39 (main building)	0	1,211,000	0	0	0	
31 Subtotal	0	1,961,000	0	0	0	
32						
33 On-Site Improvements						
34 Water	0	114,100	0	0	0	
35 Sewer	0	103,800	0	0	0	
36 Drainage	0	238,900	0	0	0	
37 Gas Distribution	0	129,800	0	0	0	
38 Electric	0	321,700	0	0	0	
39 Communications Distribution	0	103,800	0	0	0	
40 Roadways	0	207,600	0	0	0	
41 Public Spaces and Plaza	0	0	537,600	0	0	
42 Subtotal	0	1,219,700	537,600	0	0	
43						
44 Parking						
45 Surface						
46 First Phase	0	0	650,100	0	0	
47 Second Phase	0	0	0	0	140,700	
48 Garage #1	0	1,854,000	2,808,000	0	0	
49 Garage #2	0	0	0	2005400	3,037,200	
50 Subtotal	0	1,854,000	3,458,100	2,005,400	3,177,900	
51						
52 Off-Site Improvements						
53 Traffic Signals	0	0	260,000	0	0	
54 Traffic Corridor Enhancements	0	156,000	156,000	0	0	
55 Subtotal	0	156,000	416,000	0	0	
56						
58						
59 Operating Costs						
60 Project Staff	9,500	73,800	76,800	53,000	41,400	14,000
61 Fringe Benefits	2,500	18,600	19,200	13,400	10,800	3,600
62 Mass Development Reimbursement	0	0	0	0	0	
63 Office Costs	0	0	0	0	0	
64 Start-Up Costs	0	5,000	0	0	0	
65 Monthly Costs	0	12,000	12,600	13,200	13,800	4,800
66 Marketing Materials & Advertising	0	0	0	0	0	
67 Start-Up Costs	0	40,000	0	0	0	
68 Monthly Costs	0	12,000	12,600	13,200	11,400	

Table B1. Discounted Cash Flow Analysis. WADC Business Plan.

Army Materials Technology Laboratory Discounted Cash Flow Analysis

Scenario: WADC Business Plan

	1997	1998	1999	2000	2001	2002	Total	Percentage of Total
1 Land Sales Revenues								
2 Building 311	0	3,050,000	0	0	0	0	3,050,000	18%
3 Building 131	0	861,000	0	0	0	0	861,000	5%
4 Building 312	0	0	811,000	0	0	0	811,000	5%
5 Building 37	0	0	0	876,000	0	0	876,000	5%
6 Building 313	0	0	0	1,087,000	0	0	1,087,000	6%
7 Building 43	0	0	0	0	709,000	0	709,000	4%
8 Building 292	0	0	0	0	440,000	0	440,000	3%
9 Building 97	0	0	0	0	258,000	0	258,000	2%
10 Building 60	0	0	0	0	263,000	0	263,000	2%
11 Total Revenues	0	3,911,000	811,000	1,963,000	1,670,000	0	8,355,000	50%
12 Grant/Loan Revenues								
13 Economic Development Administration Grants	1,500,000	1,500,000	0	0	0	0	3,000,000	18%
14 Public Works and Economic Development Grant	0	2,000,000	0	0	0	0	2,000,000	12%
15 Community Development Action Grant	0	1,000,000	0	0	0	0	1,000,000	6%
16 Development Bonds Secured by Town Taxes	0	0	0	2,450,000	0	0	2,450,000	15%
17 Mass Development Line of Credit	144,000	(144,000)	0	0	0	0	-	0%
18 Mass Development Bridge Loan	0	0	250,000	(265,000)	0	0	(15,000)	0%
19 Total Grant/Loan Revenues	1,644,000	4,356,000	250,000	2,185,000	0	0	8,435,000	50%
20 TOTAL REVENUES	1,644,000	8,267,000	1,061,000	4,148,000	1,670,000	0	16,790,000	100%
21 Demolition								
22 Building 36	0	500,000	0	0	0	0	500,000	3%
23 Building 313C	0	0	0	0	0	0	-	0%
24 Building 37 (shed)	0	0	0	0	0	0	-	0%
25 Building 60	0	250,000	0	0	0	0	250,000	1%
26 Building 39 (addition)	0	0	0	0	0	0	-	0%
27 Building 39 (main building)	0	1,211,000	0	0	0	0	1,211,000	7%
28 Subtotal	0	1,961,000	0	0	0	0	1,961,000	12%
29 On-Site Improvements								
30 Water	0	114,100	0	0	0	0	114,100	1%
31 Sewer	0	103,800	0	0	0	0	103,800	1%
32 Drainage	0	238,900	0	0	0	0	238,900	1%
33 Gas Distribution	0	129,800	0	0	0	0	129,800	1%
34 Electric	0	321,700	0	0	0	0	321,700	2%
35 Communications Distribution	0	103,800	0	0	0	0	103,800	1%
36 Roadways	0	207,600	0	0	0	0	207,600	1%
37 Public Spaces and Plaza	0	537,600	0	0	0	0	537,600	3%
38 Subtotal	0	1,219,700	537,600	0	0	0	1,757,300	10%
39 Parking								
40 Surface	0	0	650,100	0	0	0	650,100	4%
41 First Phase	0	0	0	0	140,700	0	140,700	1%
42 Second Phase	0	1,854,000	2,808,000	0	0	0	4,662,000	28%
43 Garage #1	0	0	0	0	0	0	0	0%

Table B2. Discounted Cash Flow Analysis. CERL 1 Developed Scenario

Army Materials Technology Laboratory

Discounted Cash Flow Analysis

Scenario: CERL1 Developed Scenario - 100% Surface Parking

	1997	1998	1999	2000	2001	2002	Total	Percentage of Total
1 Land Sales Revenues								
2 Building 311	0	3,050,000	0	0	0	0	3,050,000	23%
3 Building 131	0	861,000	0	0	0	0	861,000	7%
4 Building 312	0	0	0	0	0	0	0	0%
5 Building 37	0	0	0	0	0	0	0	0%
6 Building 313	0	0	0	0	0	0	0	0%
7 Building 43	0	0	0	0	0	0	0	0%
8 Building 292	0	0	0	0	440,000	0	440,000	3%
9 Building 97	0	0	0	0	258,000	0	258,000	2%
10 Building 60	0	0	0	0	0	0	0	0%
11 Total Revenues	0	3,911,000	0	0	698,000	0	4,609,000	35%
12								
13 Grant/Loan Revenues								
14 Economic Development Administration Grants	1,500,000	1,500,000	0	0	0	0	3,000,000	23%
15 Public Works and Economic Development Grant	0	2,000,000	0	0	0	0	2,000,000	15%
16 Community Development Action Grant	0	1,000,000	0	0	0	0	1,000,000	8%
17 Development Bonds Secured by Town Taxes	0	0	0	2,450,000	0	0	2,450,000	19%
18 Mass Development Line of Credit	144,000	(144,000)	0	0	0	0	0	0%
19 Mass Development Bridge Loan	0	0	250,000	(265,000)	0	0	(15,000)	0%
20 Total Grant/Loan Revenues	1,644,000	4,356,000	250,000	2,185,000	0	0	8,435,000	65%
21								
22 TOTAL REVENUES	1,644,000	8,267,000	250,000	2,185,000	698,000	0	13,044,000	100%
23								
24								
25 Demolition								
26 Building 36	0	500,000	0	0	0	0	500,000	6%
27 Building 313C	0	0	0	0	0	0	0	0%
28 Building 37 (shed)	0	0	0	0	0	0	0	0%
29 Building 60	0	250,000	0	0	0	0	250,000	3%
30 Building 39 (addition)	0	0	0	0	0	0	0	0%
31 Building 39 (main building)	0	1,211,000	0	0	0	0	1,211,000	15%
32 Subtotal	0	1,961,000	0	0	0	0	1,961,000	24%
33								
34 On-Site Improvements								
35 Water	0	114,100	0	0	0	0	114,100	1%
36 Sewer	0	103,800	0	0	0	0	103,800	1%
37 Drainage	0	238,900	0	0	0	0	238,900	3%
38 Gas Distribution	0	129,800	0	0	0	0	129,800	2%
39 Electric	0	321,700	0	0	0	0	321,700	4%
40 Communications Distribution	0	103,800	0	0	0	0	103,800	1%
41 Roadways	0	207,600	0	0	0	0	207,600	3%
42 Public Spaces and Plaza	0	0	537,600	0	0	0	537,600	7%
43 Subtotal	0	1,219,700	537,600	0	0	0	1,757,300	22%
44								
45 Parking								
46 Surface	0	0	650,100	0	0	0	650,100	8%
47 First Phase	0	0	0	0	352,703	0	352,703	4%
48 Second Phase	0	0	650,100	0	352,703	0	1,002,803	12%
49 Subtotal	0	0	650,100	0	352,703	0	1,002,803	12%
50								

Table B3. Discounted Cash Flow Analysis. CERL1 Developed Scenario

Army Materials Technology Laboratory Discounted Cash Flow Analysis

Scenario: CERL1 Developed Scenario - Structured Parking Cost Sharing

	1997	1998	1999	2000	2001	2002	Total	Percentage Total
Land Sales Revenues								
1 Building 311	0	2,879,000	0	0	0	0	2,879,000	20%
2 Building 131	0	770,500	0	0	0	0	770,500	5%
3 Building 312	0	0	254,900	0	0	0	254,900	2%
4 Building 37	0	0	0	415,250	0	0	415,250	3%
5 Building 313	0	0	0	346,000	0	0	346,000	2%
6 Building 43	0	0	0	0	372,050	0	372,050	3%
7 Building 292	0	0	0	0	761,500	0	761,500	5%
8 Building 97	0	0	0	0	78,350	0	78,350	1%
9 Building 60	0	0	0	0	0	0	0	0%
10 Total Revenues	0	3,649,500	254,900	761,250	1,211,900	0	5,877,550	41%
Grant/Loan Revenues								
13 Economic Development Administration Grants	1,500,000	1,500,000	0	0	0	0	3,000,000	21%
14 Public Works and Economic Development Grant	0	2,000,000	0	0	0	0	2,000,000	14%
15 Community Development Action Grant	0	1,000,000	0	0	0	0	1,000,000	7%
16 Development Bonds Secured by Town Taxes	0	0	0	2,450,000	0	0	2,450,000	17%
17 Mass Development Line of Credit	144,000	(144,000)	0	0	0	0	0	0%
18 Mass Development Bridge Loan	0	0	250,000	(265,000)	0	0	(15,000)	0%
19 Total Grant/Loan Revenues	1,644,000	4,356,000	250,000	2,185,000	0	0	8,435,000	59%
TOTAL REVENUES	1,644,000	8,005,500	504,900	2,946,250	1,211,900	0	14,312,550	100%
Costs								
24 Acquisition	0	500,000	0	0	0	0	500,000	4%
25 Demolition	0	0	0	0	0	0	0	0%
26 Building 36	0	0	0	0	0	0	0	0%
27 Building 313C	0	0	0	0	0	0	0	0%
28 Building 37 (shed)	0	250,000	0	0	0	0	250,000	2%
29 Building 60	0	0	0	0	0	0	0	0%
30 Building 39 (addition)	0	1,211,000	0	0	0	0	1,211,000	10%
31 Building 39 (main building)	0	196,000	0	0	0	0	1,961,000	16%
32 Subtotal	0	1,211,000	0	0	0	0	1,961,000	16%
On-Site Improvements								
33 Water	0	114,100	0	0	0	0	114,100	1%
34 Sewer	0	103,800	0	0	0	0	103,800	1%
35 Drainage	0	238,900	0	0	0	0	238,900	2%
36 Gas Distribution	0	129,800	0	0	0	0	129,800	1%
37 Electric	0	321,700	0	0	0	0	321,700	3%
38 Communications Distribution	0	103,800	0	0	0	0	103,800	1%
39 Roadways	0	207,600	0	0	0	0	207,600	2%
40 Public Spaces and Plaza	0	0	537,600	0	0	0	537,600	5%
41 Subtotal	0	1,219,700	537,600	0	0	0	1,757,300	15%
Parking								
42 Surface	0	0	650,100	0	0	0	650,100	5%
43 First Phase	0	0	0	0	140,700	0	140,700	1%
44 Second Phase	0	927,000	1,404,000	0	0	0	2,331,000	20%
45 Garage #1	0	0	0	1,002,700	1,518,600	0	2,521,300	21%
46 Garage #2	0	0	0	0	1,659,300	0	1,659,300	15%
47 Subtotal	0	927,000	2,054,100	1,002,700	1,659,300	0	5,643,100	47%

Table B4. Discounted Cash Flow Analysis. CERL1 Developed Scenario

Army Materials Technology Laboratory

Discounted Cash Flow Analysis

Scenario: CERL1 Developed Scenario - Environmentally Encumbered Buildings

	1997	1998	1999	2000	2001	2002	Total	Percentage of Total
1 Land Sales Revenues								
2 Building 311	0	0	3,050,000	0	0	0	3,050,000	18%
3 Building 131	0	0	861,000	0	0	0	861,000	5%
4 Building 312	0	0	0	811,000	0	0	811,000	5%
5 Building 37	0	0	0	0	876,000	0	876,000	5%
6 Building 313	0	0	0	0	1,087,000	0	1,087,000	6%
7 Building 43	0	0	0	0	0	709,000	709,000	4%
8 Building 292	0	0	0	0	0	440,000	440,000	3%
9 Building 97	0	0	0	0	0	258,000	258,000	2%
10 Building 60	0	0	0	0	0	263,000	263,000	2%
11 Total Revenues	0	0	3,911,000	811,000	1,963,000	1,670,000	8,355,000	50%
12 Grant/Loan Revenues								
13 Economic Development Administration Grants	1,500,000	1,500,000	0	0	0	0	3,000,000	18%
14 Public Works and Economic Development Grant	0	2,000,000	0	0	0	0	2,000,000	12%
15 Community Development Action Grant	0	1,000,000	0	0	0	0	1,000,000	6%
16 Development Bonds Secured by Town Taxes	0	0	0	2,450,000	0	0	2,450,000	15%
17 Mass Development Line of Credit	144,000	(144,000)	0	0	0	0	-	0%
18 Mass Development Bridge Loan	0	0	250,000	(265,000)	0	0	(15,000)	0%
19 Total Grant/Loan Revenues	1,644,000	4,356,000	250,000	2,185,000	0	0	8,435,000	50%
20 TOTAL REVENUES	1,644,000	4,356,000	4,161,000	2,996,000	1,963,000	1,670,000	16,790,000	100%
21								
22								
23								
24 Demolition								
25 Building 36	0	500,000	0	0	0	0	500,000	4%
26 Building 313C	0	0	0	0	0	0	-	0%
27 Building 37 (shed)	0	0	0	0	0	0	-	0%
28 Building 60	0	250,000	0	0	0	0	250,000	2%
29 Building 39 (addition)	0	0	0	0	0	0	-	0%
30 Building 39 (main building)	0	1,211,000	0	0	0	0	1,211,000	9%
31 Subtotal	0	1,961,000	0	0	0	0	1,961,000	14%
32								
33 On-Site Improvements								
34 Water	0	114,100	0	0	0	0	114,100	1%
35 Sewer	0	103,800	0	0	0	0	103,800	1%
36 Drainage	0	238,900	0	0	0	0	238,900	2%
37 Gas Distribution	0	129,800	0	0	0	0	129,800	1%
38 Electric	0	321,700	0	0	0	0	321,700	2%
39 Communications Distribution	0	103,800	0	0	0	0	103,800	1%
40 Roadways	0	207,600	0	0	0	0	207,600	2%
41 Public Spaces and Plaza	0	0	537,600	0	0	0	537,600	4%
42 Subtotal	0	1,219,700	537,600	0	0	0	1,757,300	13%
43								
44 Parking								
45 Surface	0	0	650,100	0	0	0	650,100	5%
46 First Phase	0	0	0	0	140,700	0	140,700	1%
47 Second Phase	0	4,009,243	2,725,650	0	0	0	6,734,893	49%
48 Garage #1	0	0	0	0	0	0	-	0%
49 Garage #2	0	0	0	0	0	0	-	0%
50 Subtotal	0	4,009,243	3,375,750	0	140,700	0	7,525,693	55%

Table B5. Discounted Cash Flow Analysis. CERL1 Developed Scenario

Army Materials Technology Laboratory Discounted Cash Flow Analysis

Scenario: CERL1 Developed Scenario - USACERL Building Sales

	1997	1998	1999	2000	2001	2002	Total	Percentage of Total
1 Land Sales Revenues								
2 Building 311	0	5,758,000	0	0	0	0	5,758,000	29%
3 Building 131	0	1,541,000	0	0	0	0	1,541,000	8%
4 Building 312	0	0	509,800	0	0	0	509,800	3%
5 Building 37	0	0	0	830,500	0	0	830,500	4%
6 Building 313	0	0	0	692,000	0	0	692,000	3%
7 Building 43	0	0	0	0	744,100	0	744,100	4%
8 Building 292	0	0	0	0	1,523,000	0	1,523,000	8%
9 Building 97	0	0	0	0	156,700	0	156,700	1%
10 Building 60	0	0	0	0	0	0	-	0%
11 Total Revenues	0	7,299,000	509,800	1,522,500	2,423,800	0	11,755,100	58%
12 Grant/Loan Revenues								
13 Economic Development Administration Grants	1,500,000	1,500,000	0	0	0	0	3,000,000	15%
14 Public Works and Economic Development Grant	0	2,000,000	0	0	0	0	2,000,000	10%
15 Community Development Action Grant	0	1,000,000	0	0	0	0	1,000,000	5%
16 Development Bonds Secured by Town Taxes	0	0	0	2,450,000	0	0	2,450,000	12%
17 Mass Development Line of Credit	144,000	(144,000)	0	0	0	0	-	0%
18 Mass Development Bridge Loan	0	0	250,000	(265,000)	0	0	(15,000)	0%
19 Total Grant/Loan Revenues	1,644,000	4,356,000	250,000	2,185,000	0	0	8,435,000	42%
20 TOTAL REVENUES	1,644,000	11,655,000	759,800	3,707,500	2,423,800	0	20,190,100	100%
21 Demolition								
22 Building 36	0	500,000	0	0	0	0	500,000	4%
23 Building 313C	0	0	0	0	0	0	-	0%
24 Building 37 (shed)	0	0	0	0	0	0	-	0%
25 Building 60	0	250,000	0	0	0	0	250,000	2%
26 Building 39 (addition)	0	0	0	0	0	0	-	0%
27 Building 39 (main building)	0	1,211,000	0	0	0	0	1,211,000	9%
28 Subtotal	0	1,961,000	0	0	0	0	1,961,000	14%
29 On-Site Improvements								
30 Water	0	114,100	0	0	0	0	114,100	1%
31 Sewer	0	103,800	0	0	0	0	103,800	1%
32 Drainage	0	238,900	0	0	0	0	238,900	2%
33 Gas Distribution	0	129,800	0	0	0	0	129,800	1%
34 Electric	0	321,700	0	0	0	0	321,700	2%
35 Communications Distribution	0	103,800	0	0	0	0	103,800	1%
36 Roadways	0	207,600	0	0	0	0	207,600	2%
37 Public Spaces and Plaza	0	0	537,600	0	0	0	537,600	4%
38 Subtotal	0	1,219,700	537,600	0	0	0	1,757,300	13%
39 Parking								
40 Surface	0	0	650,100	0	0	0	650,100	5%
41 First Phase	0	0	0	0	140,700	0	140,700	1%
42 Second Phase	0	4009243	2725650	0	0	0	6,734,893	49%
43 Garage #1	0	0	0	0	0	0	-	0%
44 Garage #2	0	0	0	0	0	0	-	0%

48	Second Phase	0	0	0	0	140,700	0	\$	140,700	1%
49	Garage #1	0	4009243	2725650	0	0	0	\$	6,734,893	49%
50	Garage #2	0	0	0	0	0	0	\$	-	0%
51	Subtotal	0	4,009,243	3,375,750	0	140,700	0	\$	7,525,693	55%
52										
53	Off-Site Improvements									
54	Traffic Signals	0	0	260,000	0	0	0	\$	260,000	2%
55	Traffic Corridor Enhancements	0	156,000	156,000	0	0	0	\$	312,000	2%
56	Subtotal	0	156,000	416,000	0	0	0	\$	572,000	4%
57										
58										
59	Operating Costs									
60	Project Staff	9,500	73,800	76,800	53,000	41,400	14,000	\$	268,500	2%
61	Fringe Benefits	2,500	18,600	19,200	13,400	10,800	3,600	\$	68,100	0%
62	Mass Development Reimbursement	0	0	0	0	0	0	\$	-	0%
63	Office Costs	0	0	0	0	0	0	\$	-	0%
64	Start-Up Costs	0	5,000	0	0	0	0	\$	5,000	0%
65	Monthly Costs	0	12,000	12,600	13,200	13,800	4,800	\$	56,400	0%
66	Marketing Materials & Advertising	0	0	0	0	0	0	\$	-	0%
67	Start-Up Costs	0	40,000	0	0	0	0	\$	40,000	0%
68	Monthly Costs	0	12,000	12,600	13,200	11,400	0	\$	49,200	0%
69	Development Negotiations, Legal	40,000	81,600	20,800	21,600	45,900	0	\$	209,900	2%
70	Development Advisory Services	90,000	31,200	-	16,200	16,900	0	\$	154,300	1%
71	Utilities	0	136,400	148,200	100,600	41,200	0	\$	426,400	3%
72	Insurance	0	55,500	58,600	42,200	17,100	0	\$	173,400	1%
73	Security	0	55,200	76,200	39,600	6,800	0	\$	177,800	1%
74	Snow Removal	0	20,600	21,300	22,100	23,100	0	\$	87,100	1%
75	Maintenance Contracts	0	88,100	97,200	64,800	26,400	0	\$	276,500	2%
76	Subtotal	142,000	630,000	543,500	399,900	254,800	22,400	\$	1,992,600	14%
77										
78	TOTAL EXPENDITURES	142,000	7,975,943	4,872,850	399,900	395,500	22,400	\$	13,808,583	100%
79										
80	Net Revenues/(Losses)	1,502,000	3,679,057	(4,113,050)	3,307,600	2,028,300	(22,400)	\$	6,381,507	
81										
82	Cumulative Net Revenues	1,502,000	5,181,057	1,068,007	4,375,607	6,403,907	6,381,507			
83										
84	Present Value Period									
85	Present Value of Flows @	6%	1,416,981	3,274,348	(3,453,366)	2,619,929	1,515,664		(15,791)	
86										
87	Net Present Value (NPV)		\$ 5,357,734	\$ 3,348,713	\$ 4,224,058					
88			With Reduced Parking Requirement	With Total Capital Costs	With Reduced Structured Parking Costs					
89										
90										
91	Present Value Period									
92	Present Value of Flows @	11%	\$ 1,416,981	\$ 5,192,506	\$ (3,522,539)	\$ 1,031,464	\$ (753,909)		\$ (15,791)	
93										
94	Net Present Value (NPV)		\$ 3,267,852	\$ 4,006,379	\$ 4,702,272					
95			With Total Capital Costs	With Reduced Structured Parking Costs	With Reduced Structured Parking Requirement					
96										

USACERL AMTLEDC.xls USACERL Building Sales

Table B6. Scenario and Sensitivity Analysis

Army Materials Technology Laboratory
Scenario and Sensitivity Analysis Table - Range of Scenario NPVs

Scenario - WADC EDC Application Business Plan				Revenues			Operating Costs		
	Years 1-3	Years 4-6	Totals	Years 1-3	Years 4-6	Totals	Years 1-3	Years 4-6	Totals
Total Project Analysis View									
Cash flow with total capital costs	10,972,000	5,818,000	16,790,000	1,315,500	677,100	1,992,600	9,656,500		
Project Analysis with Reduced Parking Structure Costs									
Cash flow with USACERL developed costs for WADC proposed structured parking	10,972,000	5,818,000	16,790,000	1,315,500	677,100	1,992,600	9,656,500		
Project Analysis with Reduced Parking Requirements									
Cash flow under parking-constrained assumptions	10,972,000	5,818,000	16,790,000	1,315,500	677,100	1,992,600	9,656,500		
USACERL Developed Scenarios - CERL1									
1. Impact of 100% Surface Parking Scenario									
Total Project Analysis View									
Cash flow without structured parking and increased O&M and surface parking costs	10,161,000	2,883,000	13,044,000	1,590,992	1,241,035	2,832,027	8,570,008		
Project Analysis with USACERL Building Sales									
Cash flow with USACERL developed building residual values	13,549,000	3,864,700	17,413,700	1,590,992	1,241,035	2,832,027	11,958,008		
Project Analysis with Environmental Encumbrances									
Cash flow with delayed sales of buildings	13,549,000	3,864,700	17,413,700	1,590,992	1,241,035	2,832,027	11,958,008		
Impact of Scenario Assumption from WADC baseline			(3,746,000)			839,427			
2. Impact of Parking Structure Cost Sharing									
Total Project Analysis View									
Cash flow with 50% cost of parking structures	8,611,000	4,133,000	12,744,000	1,315,500	677,100	1,992,600	7,296,500		
Project Analysis with USACERL Building Sales									
Cash flow with USACERL developed building residual values	10,154,400	4,158,150	14,312,550	1,315,500	677,100	1,992,600	8,838,900		
Project Analysis with Environmental Encumbrances									
Cash flow with delayed sales of buildings	9,899,500	4,413,050	14,312,550	1,315,500	677,100	1,992,600	8,584,000		
Impact of Scenario Assumption from WADC baseline			(2,477,450)			-			
Impact of Scenario Assumption from 100% surface parking scenario			1,268,550			(839,427)			
3. Impact of Environmentally Encumbered Buildings									
Total Project Analysis View									
Cash flow with total capital costs and WADC building values	10,161,000	6,629,000	16,790,000	1,315,500	677,100	1,992,600	8,845,500		
Project Analysis with Reduced Parking Structure Costs									
Cash flow with USACERL developed costs for WADC proposed structured parking	10,161,000	6,629,000	16,790,000	1,315,500	677,100	1,992,600	8,845,500		
Project Analysis with Reduced Parking Requirements									
Cash flow under parking-constrained assumptions	10,161,000	6,629,000	16,790,000	1,315,500	677,100	1,992,600	8,845,500		
Impact of Scenario Assumption from WADC baseline			-			-			
Impact of Scenario Assumption from parking structure cost sharing			2,477,450			-			
4. Impact of USACERL Developed Building Sales									
Total Project Analysis View									
Cash flow with total capital costs	14,058,800	6,131,300	20,190,100	1,315,500	677,100	1,992,600	12,743,300		
Project Analysis with Reduced Parking Structure Costs									
Cash flow with USACERL developed costs for WADC proposed structured parking	14,058,800	6,131,300	20,190,100	1,315,500	677,100	1,992,600	12,743,300		
Project Analysis with Reduced Parking Requirements									
Cash flow under parking-constrained assumptions	14,058,800	6,131,300	20,190,100	1,315,500	677,100	1,992,600	12,743,300		
Impact of Scenario Assumption from WADC baseline			3,400,100			-			
Impact of Scenario Assumption from environmentally encumbered buildings			3,400,100			-			

Totals	Operating Cash Flows			Capital Costs			Total Cash Flows			Net Present Value 6 years Discount Rate	
	Years 1-3	Years 4-6	Totals	Years 1-3	Years 4-6	Totals	Years 1-3	Years 4-6	Totals	11%	8%
1,992,800	9,656,500	5,140,900	14,797,400	9,602,400	5,183,300	14,785,700	54,100	(42,400)	11,700	\$ 581,137	\$ 371,933
1,992,800	9,656,500	5,140,900	14,797,400	9,174,030	4,522,384	13,696,414	482,470	618,516	1,100,986	\$ 1,319,664	\$ 1,247,277
1,992,800	9,656,500	5,140,900	14,797,400	11,675,293	140,700	11,815,993	(2,018,793)	5,000,200	2,961,407	\$ 2,015,567	\$ 2,380,964

Totals	Operating Cash Flows			Capital Costs			Total Cash Flows			Net Present Value 6 years Discount Rate	
	Years 1-3	Years 4-6	Totals	Years 1-3	Years 4-6	Totals	Years 1-3	Years 4-6	Totals	11%	8%
2,832,027	8,570,008	1,641,965	10,211,973	4,940,400	352,703	5,293,103	3,629,608	1,289,262	4,918,670	\$ 4,129,300	\$ 4,489,463
2,832,027	11,958,008	2,623,665	14,581,673	4,940,400	352,703	5,293,103	7,017,608	2,270,962	9,288,570	\$ 7,461,668	\$ 8,208,355
2,832,027	11,958,008	2,623,665	14,581,673	4,940,400	352,703	5,293,103	7,017,608	2,270,962	9,288,570	\$ 6,775,817	\$ 7,789,604
839,427			(4,585,427)			(4,492,597)			4,907,170	\$ 3,548,163	\$ 4,087,530
1,992,800	7,295,500	3,455,900	10,751,400	7,271,400	2,662,000	9,933,400	24,100	793,900	818,000	\$ 974,166	\$ 724,285
1,992,800	8,838,900	3,481,050	12,319,950	7,271,400	2,662,000	9,933,400	1,567,500	819,050	2,386,550	\$ 2,239,484	\$ 2,310,939
1,992,800	8,584,000	3,735,950	12,319,950	7,271,400	2,662,000	9,933,400	1,312,600	1,073,950	2,386,550	\$ 1,806,514	\$ 2,029,582
-			(2,477,450)			(4,852,300)			2,374,850	1,658,347	1,939,006
(839,427)			2,107,977			4,640,297			(2,532,320)	(1,889,818)	(2,148,524)
1,992,800	8,845,500	5,951,900	14,797,400	9,602,400	5,183,300	14,785,700	(756,900)	768,600	11,700	\$ (18,551)	\$ (22,265)
1,992,800	8,845,500	5,951,900	14,797,400	9,174,030	4,522,384	13,696,414	(328,530)	1,429,516	1,100,986	\$ 719,976	\$ 863,080
1,992,800	8,845,500	5,951,900	14,797,400	11,675,293	140,700	11,815,993	(2,829,793)	5,811,200	2,961,407	\$ 1,415,868	\$ 1,966,736
-						(2,969,707)			2,969,707	834,731	1,614,803
-			2,477,450			1,882,593			594,857	(823,616)	(324,203)
1,992,800	12,743,300	5,454,200	18,197,500	9,602,400	5,183,300	14,785,700	3,140,900	270,900	3,411,800	\$ 3,267,852	\$ 3,348,713
1,992,800	12,743,300	5,454,200	18,197,500	9,174,030	4,522,384	13,696,414	3,569,270	931,816	4,501,086	\$ 4,006,379	\$ 4,224,058
1,992,800	12,743,300	5,454,200	18,197,500	11,675,293	140,700	11,815,993	1,068,007	5,313,500	6,381,507	\$ 4,702,272	\$ 5,357,734
-			3,400,100			-			3,400,100	2,686,715	\$ 4,985,801
-			3,400,100			-			3,400,100	1,851,984	3,370,998

CONCLUSION: Estimated WADC Business Plan Valuation

USACERL Building Sales and WADC Total Capital Costs

11%
\$ 3,267,852

USACERL Building Sales with Reduced Structured Parking Requirement

8%
\$ 5,357,734

Total of USACERL's Estimation of Present Value for the WADC Business Plan

\$ 3,267,852 \$ 5,357,734

Table B7. Building 311 Residual Value and Financial Feasibility.

Building 311
Developer Financial Feasibility

R&D Use		317866/2		158983 SF		Capital Improvements		Year 0		Year 1		Year 2		Year 3		Year 4		Year 5	
CERL Net Developable Area				158983 SF		Gross Square Feet		\$12,512,485		\$3,597,339		\$3,597,339		\$3,597,339		\$3,597,339		\$22,431,318	
Net Rent				\$10.27 /yr		Fit-Up Cost per SQ FT				\$2,703,075		\$2,703,075		\$2,703,075		\$2,703,075		\$2,703,075	
Gross Rent Annualized				\$1,632,755		Total Cost				\$684,264		\$684,264		\$684,264		\$684,264			
Vacancy Loss		5%		\$81,638 /yr		Stabilized Income Stream													
Effective Gross Income				\$1,551,118 /yr															
Operating Expense Ratio		5%		\$77,556															
Total Operating Expenses				\$77,556 /yr															
Net Operating Income				\$1,473,562 /yr															
Stabilized Income Stream				\$1,473,562 /yr															
Capitalization Rate				11.5%															
R&D Value				\$12,813,581		Internal Rate of Return		14.686732%											
						Price Per SQ FT (residual)		\$18.11											
Office Use		317866/2		158983		Capital Improvements				Debt Service Assumptions									
CERL Net Developable Area				\$25.11		Gross Square Feet				Principal		\$31,281,211.68							
Net Rent				\$3,982,063		Fit-Up Cost per SQ FT				Loan To Value Ratio		80%							
Gross Rent Annualized				\$198,603 /yr		Total Cost				Term		15 Years							
Vacancy Loss		5%		\$3,782,460 /yr		Stabilized Income Stream				Rate		12% Annual							
Effective Gross Income				\$1,668,682															
Operating Expense Ratio		44%		\$1,668,682 /yr															
Total Operating Expenses				\$2,123,778 /yr															
Net Operating Income				\$2,123,778 /yr															
Stabilized Income Stream				\$2,123,778 /yr															
Capitalization Rate				11.5%															
Office Value				\$18,467,631															
Total Value Under																			
Direct Capitalization Method				\$31,281,212															
Total Fit-Up Costs				\$25,523,131															

USACERL

Residual Value

\$ 5,758,081

Residual Price/SF

\$ 18.11

WADC

Residual Value

\$ 3,050,000

Residual Price/SF

\$ 10.00

Debt Service Assumptions
 Principal \$31,281,211.68
 Loan To Value Ratio 80%
 Term 15 Years
 Rate 12% Annual

USACERL AMTL 01 311

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Table B10. Building 37 Residual Value and Financial Feasibility.

Building 37 Developer Financial Feasibility

Developable SF 41220

R&D Use		20613 SF		20613 SF		Rate		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
CERL Net Developable Area		41226/2		20613 SF									
Net Rent				\$10.68 /yr									
Gross Rent Annualized				\$220,246									
Vacancy Loss		5%		\$11,012 /yr									
Effective Gross Income				\$209,236 /yr									
Operating Expense Ratio		5%		\$10.462									
Total Operating Expenses				\$10,462 /yr									
Net Operating Income				\$198,774 /yr									
Stabilized Income Stream				\$198,774 /yr									
Capitalization Rate				11.5%									
R&D Value				\$1,728,468									
Specialized Mfg. Use													
CERL Net Developable Area		41226/2		20613									
Net Rent				\$6.30 /yr									
Gross Rent Annualized				\$128,961									
Vacancy Loss		5%		\$6,498 /yr									
Effective Gross Income				\$123,463 /yr									
Operating Expense Ratio		5%		\$6,173									
Total Operating Expenses				\$6,173 /yr									
Net Operating Income				\$117,290 /yr									
Stabilized Income Stream				\$117,290 /yr									
Capitalization Rate				11.5%									
Specialized Mfg Value				\$1,019,914									
Total Value Under													
Direct Capitalization Method				\$2,748,382									
Total Fit-Up Costs				\$1,917,834									

USACERL

Residual Value

\$ 830,549

Residual Price/SF

\$ 20.15

WADC

Residual Value

\$ 876,000

Residual Price/SF

\$ 16.22

Internal Rate of Return
Price Per SQ FT (residual)

14.686732%
\$20.15

Debt Service Assumptions

Principal \$2,748,382.04
Loan To Value Ratio 60%
Term 15 Years
Rate 12% Annual

Capital Improvements
Gross Square Feet
Fit-Up Cost per SQ FT
Total Cost
Stabilized Income Stream

20613 SF
\$46.52
\$958,916.76
\$117,290.11 /yr

Capital Improvements
Gross Square Feet
Fit-Up Cost per SQ FT
Total Cost
Stabilized Income Stream

20613 SF
\$46.52
\$958,916.76
\$198,773.83 /yr

Discounted Cash Flows

Net Operating Income
Debt Service
Before Tax Cash Flow

Year 0
-\$1,099,353
-\$1,099,353

Year 1
\$316,064
\$237,493
\$78,570

Year 2
\$316,064
\$237,493
\$78,570

Year 3
\$316,064
\$237,493
\$78,570

Year 4
\$316,064
\$237,493
\$78,570

Year 5
\$1,970,826
\$237,493
\$1,733,333

Table B11. Building 313 Residual Value and Financial Feasibility.

Building 313 Developer Financial Feasibility

		Developable SF 47348		Rate		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
R&D Use											
CERL Net Developable Area	47348/2	23674 SF									
Net Rent		\$10.68 /yr									
Gross Rent Annualized		\$252,955									
Vacancy Loss	5%	\$12,848 /yr									
Effective Gross Income		\$240,307 /yr									
Operating Expense Ratio	5%	\$12,015									
Total Operating Expenses		\$12,015 /yr									
Net Operating Income		\$228,291 /yr									
Stabilized Income Stream		\$228,291 /yr									
Capitalization Rate		11.5%									
R&D Value		\$1,985,143									
Specialized Mfg. Use											
CERL Net Developable Area	47348/2	23674									
Net Rent		\$6.30 /yr									
Gross Rent Annualized		\$149,280									
Vacancy Loss	5%	\$7,463 /yr									
Effective Gross Income		\$141,797 /yr									
Operating Expense Ratio	5%	\$7,090									
Total Operating Expenses		\$7,090 /yr									
Net Operating Income		\$134,708 /yr									
Stabilized Income Stream		\$134,708 /yr									
Capitalization Rate		11.5%									
Specialized Mfg Value		\$1,171,370									
Total Value Under											
Direct Capitalization Method		\$3,156,513									
Total Fit-Up Costs		\$2,464,463									

USACERL

Residual Value	\$ 692,049
Residual Price/SF	\$ 14.62

WADC

Residual Value	\$ 1,087,000
Residual Price/SF	\$ 16.22

		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Capital Improvements							
Gross Square Feet	23674 SF						
Fit-Up Cost per SQ FT	\$52.05						
Total Cost	\$1,232,231.70						
Stabilized Income Stream	\$228,291.45 /yr						
Discounted Cash Flows							
Net Operating Income		-\$1,262,605	\$362,999	\$362,999	\$362,999	\$362,999	\$2,263,491
Debt Service			\$272,761	\$272,761	\$272,761	\$272,761	\$272,761
Before Tax Cash Flow		-\$1,262,605	\$80,238	\$80,238	\$80,238	\$80,238	\$1,990,730
Internal Rate of Return							
Price Per SQ FT (residual)		14.686732%					
		\$14.62					
Debt Service Assumptions							
Principal				\$3,156,512.71			
Loan To Value Ratio				60%			
Term				15 Years			
Rate				12% Annual			
Capital Improvements							
Gross Square Feet	23674 SF						
Fit-Up Cost per SQ FT	\$52.05						
Total Cost	\$1,232,231.70						
Stabilized Income Stream	\$134,707.51 /yr						

Table B14. Building 97 Residual Value and Financial Feasibility.

Building 97
Developer Financial Feasibility

Developable SF 209000

R&D Use		10450 SF	10450 SF	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
CERL Net Developable Area	20900/2								
Net Rent		\$11.12 /yr							
Gross Rent Annualized		\$116,168							
Vacancy Loss	5%	\$5,808 /yr							
Effective Gross Income		\$110,360 /yr							
Operating Expense Ratio	5%	\$5,518							
Total Operating Expenses		\$5,518 /yr							
Net Operating Income		\$104,842 /yr							
Stabilized Income Stream		\$104,842 /yr							
Capitalization Rate		11.5%							
R&D Value		\$911,668							
Office Use		10450							
CERL Net Developable Area	20900/2								
Net Rent		\$27.18							
Gross Rent Annualized		\$284,030							
Vacancy Loss	5%	\$14,201 /yr							
Effective Gross Income		\$269,828 /yr							
Operating Expense Ratio	44%	\$118,724							
Total Operating Expenses		\$118,724 /yr							
Net Operating Income		\$151,104 /yr							
Stabilized Income Stream		\$151,104 /yr							
Capitalization Rate		11.5%							
Office Value		\$1,313,946							
Total Value Under		\$2,225,614							
Direct Capitalization Method		\$2,068,891							
Total Fit-Up Costs									

USACERL

Residual Value

\$ 156,723

Residual Price/SF

\$ 7.50

WADC

Residual Value

\$ 258,000

Residual Price/SF

\$ 17.20

Internal Rate of Return
Price Per SQ FT (residual)
14.686732%
\$7.50

Debt Service Assumptions
Principal \$2,225,614
Loan To Value Ratio 60%
Term 15 Years
Rate 12% Annual

Appendix C: Engineering Analysis

Table C1. Infrastructure divisions.

Infrastructure Systems	
Transportation	
	<i>Roads*</i>
	<i>Parking Lots</i>
	Airfields
	Helipads
	Sidewalks
	<i>Traffic signalization</i>
Utilities - Water	
	<i>Storm Sewer</i>
	<i>Sanitary Sewer</i>
	<i>Domestic water</i>
Utilities - Energy	
	<i>Electrical</i>
	<i>Natural Gas</i>
	Heating
	Cooling
Buildings	
	<i>Demolition</i>
	<i>Rehabilitation</i>
	New
Misc.	
	<i>Telephone</i>
	<i>Landscaping</i>
	Landfills
	Industrial Waste
	Compressed Air

* The italicized divisions are those evaluated in this application.

Table C2. Condition rating scale.

Condition Rating Category	Condition Descriptions		
	Amount of Deterioration Present	How the Distress affects the Functionality	Type of Maintenance & Repair required to repair the distress
Excellent	Minimal Deterioration	Functionality is not Impaired	Preventive/minor maintenance, or minor repair
Very Good	Minor Deterioration	Functionality is Slightly Impaired	Preventive/minor maintenance, or minor repair
Good	Moderate Deterioration	Functionality is Somewhat Impaired	Moderate maintenance or minor repair
Fair	Significant Deterioration	Functionality is Seriously Impaired	Significant maintenance or moderate repair
Poor	Severe Deterioration Over a Small Amount (10% to 25% of area)	Functionality is Critically impaired	Major repair
Very Poor	Severe Deterioration over a Moderate Amount	Functionality Barely Exists!	Major repair but less than total restoration
Failed	Severe Deterioration Over a Large Portion (> 66% of area)	Functionality is Lost!	Total restoration!

Table C3. Capacity rating scale.

Capacity Rating Category	How Design/build Affects the Capacity	Type of Maintenance & Repair or Alteration Required To Meet Capacity
Excellent	Capacity far exceeds requirements	Preventive maintenance or minor repair
Very Good	Capacity meets or barely exceeds requirements	Minor repair or alteration
Good	Capacity meets requirements	Moderate repair or alteration
Fair	Capacity meets requirements without safety factors	Significant repair or alteration
Poor	Capacity cannot meet requirements	Major rebuild
Very Poor	Capacity cannot meet requirements	Major rebuild but less than total restoration
Failed	Requirements far exceeds capacity	Total rebuild!

Since "site utility costs" is a very broad and generic term, a more detailed explanation is required. Table C4 shows the comparison between AMTL costs and USACERL costs.

Table C4. Site utility costs (in 1997 dollars).

Project Description	AMTL Cost	USACERL Minimum Scenario Low	USACERL Minimum Scenario High	USACERL Maximum Scenario Low	USACERL Maximum Scenario High
Cost Item					
Install new pipe and appurtenances	\$80,000	\$42,000	\$49,000	\$74,000	\$88,000
Install backflow preventors and a structure	\$30,000	\$22,000	\$26,000	\$46,000	\$54,000
<i>Total Utilities - Water; Domestic water</i>	<i>\$110,000</i>	<i>\$64,000</i>	<i>\$75,000</i>	<i>\$120,000</i>	<i>\$142,000</i>
Install new sewer pipe	\$30,000	\$17,000	\$20,000	\$29,000	\$35,000
Install new structures	\$20,000	\$8,000	\$10,000	\$16,000	\$19,000
Sewer line replacement and contingency	\$35,000	\$34,000	\$40,000	\$34,000	\$40,000
Structure cleaning and reset	\$15,000	\$6,000	\$8,000	\$15,000	\$17,000
<i>Total Utilities - Water; Sanitary Sewer</i>	<i>\$100,000</i>	<i>\$65,000</i>	<i>\$78,000</i>	<i>\$94,000</i>	<i>\$111,000</i>
Install new drain pipe	\$60,000	\$62,000	\$74,000	\$70,000	\$82,000
Install new structures	\$15,000	\$17,000	\$21,000	\$17,000	\$21,000
Drain line replacement contingency	\$60,000	\$49,000	\$58,000	\$49,000	\$58,000
Structure cleaning and reset	\$20,000	\$12,000	\$14,000	\$20,000	\$23,000
Install water quality inlets	\$75,000	\$64,000	\$75,000	\$79,000	\$94,000
<i>Total Utilities - Water; Storm Sewer</i>	<i>\$230,000</i>	<i>\$204,000</i>	<i>\$242,000</i>	<i>\$235,000</i>	<i>\$278,000</i>
Repair distribution system	\$125,000	\$109,000	\$129,000	\$138,000	\$163,000
<i>Total Energy: Natural Gas</i>	<i>\$125,000</i>	<i>\$109,000</i>	<i>\$129,000</i>	<i>\$138,000</i>	<i>\$163,000</i>
Install new primary system of ducts and banks	\$110,000	\$143,000	\$121,000	\$148,000	\$175,000
Install replacement cable	\$200,000	\$99,000	\$117,000	\$197,000	\$233,000
<i>Total Energy; Electrical</i>	<i>\$310,000</i>	<i>\$242,000</i>	<i>\$238,000</i>	<i>\$345,000</i>	<i>\$408,000</i>
Repairs to the distribution system	\$100,000	\$88,000	\$104,000	\$130,000	\$154,000
<i>Total Misc.; Communications</i>	<i>\$100,000</i>	<i>\$88,000</i>	<i>\$104,000</i>	<i>\$130,000</i>	<i>\$154,000</i>
Total:	\$975,000	\$772,000	\$866,000	\$1,062,000	\$1,256,000

Utilities - Water, Domestic Water

Condition

The condition of the domestic water system is at the bottom of the "Excellent" range. WADC will have to do very little to maintain it in this condition. Repairs should include replacing one or two manholes. The estimated costs for these improvements should range from \$772,000 to \$866,000.

Function

The function of the domestic water system is at the bottom of the **"Excellent"** range. Each of these systems could require up to total replacement. USACERL estimates the costs to do these improvements should range from \$1,062,000 to \$1,256,000.

The LRA estimates the cost to do this work at \$975,000 and appears a little low, but reasonable.

Utilities - Water, Sanitary Sewer

Condition

The condition of the sanitary sewer system is at the bottom of the **"Excellent"** range. The LRA will have to do very little to maintain it in this condition. Repairs should include replacing one or two manholes, limited amounts of pipe, and limited amounts of electrical line. The estimated costs to do these improvements should range from \$772,000 to \$866,000.

Function

The function of the sanitary sewer system is at the bottom of the **"Excellent"** range. USACERL estimates the costs to do these improvements should range from \$1,062,000 to \$1,256,000.

The LRA estimates the cost to do this work at \$975,000, which appears a little low, but reasonable.

Utilities - Water, Storm Sewer

Condition

The condition of the storm sewer is at the bottom of the **"Excellent"** range. The LRA will have to do very little to maintain it in this condition. Repairs should include replacing one or two manholes and limited amounts of pipe. The estimated costs to do these improvements should range from \$772,000 to \$866,000.

Function

The function of the storm sewer is at the bottom of the **"Excellent"** range. USACERL estimates the costs to do these improvements should range from \$1,062,000 to \$1,256,000.

The LRA estimates the cost to do this work at \$975,000, which appears a little low, but reasonable.

Utilities - Energy, Natural Gas**Condition**

The condition of the natural gas system is at the bottom of the **"Excellent"** range. The LRA will have to do very little to maintain it in this condition. The estimated costs to do these improvements should range from \$772,000 to \$866,000.

Function

The function of the natural gas system is at the bottom of the **"Excellent"** range. USACERL estimates the costs to do these improvements should range from \$1,062,000 to \$1,256,000.

The LRA estimates the cost to do this work at \$975,000, which appears a little low, but reasonable.

Utilities - Energy, Electrical**Condition**

The condition of the electrical system is at the bottom of the **"Excellent"** range. The LRA will have to do very little to maintain it in this condition. Repairs should include replacing one or two manholes, limited amounts of pipe, and limited amounts of electrical line. The estimated costs to do these improvements should range from \$772,000 to \$866,000.

Function

The function of the electrical system is at the bottom of the **"Fair"** range. USACERL estimates the costs to do these improvements should range from \$1,062,000 to \$1,256,000.

The LRA estimates the cost to do this work at \$975,000, which appears a little low, but reasonable.

Miscellaneous - Telephone Communications**Condition**

The condition of the telephone system is at the bottom of the **"Excellent"** range. The LRA will have to do very little to maintain it in this condition. The estimated costs to do these improvements should range from \$772,000 to \$866,000.

Function

The function of the telephone system is at the bottom of the **"Fair"** range. USACERL estimates the costs to do these improvements should range from \$1,062,000 to \$1,256,000.

The LRA estimates the cost to do this work at \$975,000, which appears a little low, but reasonable.

Parking

Table C5. Parking garage estimate for 450 parking stalls (in 1997)

Action	Quantity	UOM	Cost/unit	Total Cost	Means Ref. No.	Book
INSTALL FOUNDATIONS						
<i>Install spread footings</i>						
Excavate, form, and pour spread footings (5'x5')	49	EA	\$398.00	\$19,502	A1.1-120-7610	97 Assembly p. 2
				Total	\$19,502	
<i>Install Grade walls</i>						
Excavate, form, and pour grade walls (12"x40")	1,140	LF	\$68.50	\$78,090	A1.1-230-3420	97 Assembly p. 7
Install foundation dampproofing	1,140.0	LF	\$3.77	\$4,298	A1.1-292-2000	97 Assembly p.9
Install foundation drainage	1,140.0	LF	\$8.05	\$9,177	A1.1-294-1100	97 Assembly p. 10
				Total	\$91,565	
<i>Install slab as base floor</i>						
Excavate for slab	1,000	CY	\$1.98	\$1,980	022-238-1500	97 Site p. 41
Form and pour 8" slab	27,000	SF	\$7.18	\$193,860	A2.1-200-6760	97 Assembly p. 31
				Total	\$195,840	
GRAND TOTAL FOR FOUNDATIONS					\$306,907	
INSTALL STRUCTURE						
<i>Install columns</i>						
Form and pour 16" square columns	2,352	VLF	\$70.00	\$164,640	A3.1-114-8300	97 Assembly p. 38
Install and remove scaffolding	14	CCF	\$85.00	\$1,185	015-254-0560	96 Building p. 13
				Total	\$165,825	
<i>Install slabs</i>						
Form and pour 7" slabs	108,000	SF	\$9.14	\$987,228	A3.5-150-4200	97 Assembly p. 71 + 10% for ramps
Install and remove scaffolding	158	CCF	\$85.00	\$13,388	015-254-0560	96 Building p. 13
				Total	\$1,000,616	
<i>Install beams</i>						
Install 18" x 36" precast beams width wise	1,470	LF	\$104.35	\$153,394	A3.1-222-3200	97 Assembly p. 51
Install 18" x 36" precast beams lengthwise	1,140	LF	\$104.35	\$118,959	A3.1-222-3200	97 Assembly p. 51
				Total	\$272,354	
GRAND TOTAL FOR STRUCTURE					\$1,438,794	

INSTALL WALLS						
Install walls						
Install walls	16,560	SF	\$25.52	\$422,611	A4.1-273-1020	97 Assembly p. 175 + 10% historic matching
Install and remove scaffolding	16	EA	\$330.00	\$5,280	015-255-3000	96 Building p. 13
Total				\$427,891		
Install Fire protection						
Install system on base floor	27,000	SF	\$2.03	\$54,810	A8.2-110-1100	97 Assembly p. 292
Install system on additional floors	108,000	SF	\$1.69	\$182,520	A8.2-110-1220	98 Assembly p. 292
Total				\$237,330		
Install lights						
Install surface mounted fluorescent lights	135,000	SF	\$1.64	\$221,400	A9.2-213-0200	97 Electrical p. 299
Total				\$221,400		
Paint markings						
Layout of parking stalls	18,000	LF	\$0.04	\$720	025-804-0790	97 Site p.70
Paint stalls (Thermoplastic)	450	EA	\$4.39	\$1,976	025-804-0800	97 Site p. 70
Paint handicap stalls	9	EA	\$80.50	\$724	025-804-1200	97 Site p. 70
Install wheel stops	450	EA	\$31.50	\$14,175	028-408-1000	97 Site p. 108
Layout of arrows	192	SF	\$4.61	\$885	025-804-0760	97 Site
Install arrows	192	SF	\$4.61	\$885	025-804-0760	97 Site
Total				\$19,365		
GRAND TOTAL FOR WALLS				\$905,986		
INSTALL STAIRS AND ELEVATOR						
Install strip footings						
Excavate, form, and pour strip footings	90	LF	\$25.25	\$2,272	A1.1-140-2500	97 Assembly p. 4
Total				\$2,272		
Install walls						
Install walls	4,320	SF	\$25.52	\$110,246	A4.1-273-1020	97 Assembly p. 175 + 10% historic matching
Total				\$110,246		
Install stairs						
Form and pour stairs	4	FL	\$2,950.00	\$11,800	A3.9-100-0550	97 Assembly p. 127
Total				\$11,800		
Install elevator						
Install elevator	1	EA	\$65,200.00	\$65,200	A7.1-100-1400	97 Assembly p. 256
Total				\$65,200		

GRAND TOTAL FOR CONVEYANCES		\$189,519	
SUBTOTAL		\$2,841,206	
City cost index		128%	
TOTAL			\$3,631,061
TOTAL with contingency of:	10%		\$3,994,167
TOTAL with contingency of:	30%		\$4,720,379
ROUNDED TO			\$3,994,000
ROUNDED TO			\$4,720,000

Table C6. Parking garage estimate for 640 parking stalls (in 1997 dollars).

Action	Quantity	UOM	Cost/unit	Total Cost	Means Ref. No.	Book
INSTALL FOUNDATIONS						
Install spread footings						
Excavate, form, and pour spread footings (5'x5')	68	EA	\$398.00	\$27,064	A1.1-120-7610	97 Assembly p 2
				Total	\$27,064	
Install Grade walls						
Excavate, form, and pour grade walls (12"x40")	1,520	LF	\$68.50	\$104,120	A1.1-230-3420	97 Assembly p 7
Install foundation dampproofing	1,520.0	LF	\$3.77	\$5,730	A1.1-292-2000	97 Assembly p 9
Install foundation drainage	1,520.0	LF	\$8.05	\$12,236	A1.1-294-1100	97 Assembly p 10
				Total	\$122,086	
Install slab as base floor						
Excavate for slab	1,422	CY	\$1.98	\$2,816	022-238-1500	97 Site p. 41
Form and pour 8" slab	38,400	SF	\$7.18	\$275,712	A2.1-200-6760	97 Assembly p 31
				Total	\$278,528	
GRAND TOTAL FOR FOUNDATIONS					\$427,678	
INSTALL STRUCTURE						
Install columns						
Form and pour 16" square Columns	3,264	VLF	\$70.00	\$228,480	A3.1-114-8300	97 Assembly p 38
Install and remove scaffolding	19	CCF	\$85.00	\$1,644	015-254-0560	96 Building p 13
				Total	\$230,124	

Install slabs						
Form and pour 7" slabs	153,600	SF	\$9.14	\$1,404,058	A3.5-150-4200	97 Assembly p 71 + 10% for ramps
Install and remove scaffolding	224	CCF	\$85.00	\$19,040	015-254-0560	96 Building p 13
Total					\$1,423,098	
Install beams						
Install 18" x 36" precast beams width wise	2,040	LF	\$104.35	\$212,874	A3.1-222-3200	97 Assembly p 51
Install 18" x 36" precast beams Lengthwise	1,520	LF	\$104.35	\$158,612	A3.1-222-3200	97 Assembly p 51
Total					\$371,486	
GRAND TOTAL FOR STRUCTURE					\$2,024,708	
INSTALL WALLS						
Install walls						
Install brick walls	21,120	SF	\$25.52	\$538,982	A4.1-273-1020	97 Assembly p 175 + 10% historic matching
Install and remove scaffolding	16	EA	\$330.00	\$5,280	015-255-3000	96 Building p. 13
Total					\$544,262	
Install fire protection						
Install system on base floor	38,400	SF	\$2.03	\$77,952	A8.2-110-1100	97 Assembly p. 292
Install system on additional floors	153,600	SF	\$1.69	\$259,584	A8.2-110-1220	98 Assembly p. 292
Total					\$337,536	
Install lights						
Install surface mounted Fluorescent lights	192,000	SF	\$1.64	\$314,880	A9.2-213-0200	97 Electrical p. 299
Total					\$314,880	
Paint markings						
Layout of parking stalls	25,600	LF	\$0.04	\$1,024	025-804-0790	97 Site p.70
Paint stalls (Thermoplastic)	640	EA	\$4.39	\$2,810	025-804-0800	97 Site p. 70
Paint handicap stalls	13	EA	\$80.50	\$1,030	025-804-1200	97 Site p. 70
Install wheel stops	640	EA	\$31.50	\$20,160	028-408-1000	97 Site p. 108
Layout of directional arrows	192	SF	\$4.61	\$885	025-804-0760	97 Site
Install directional arrows	192	SF	\$4.61	\$885	025-804-0760	97 Site
Total					\$26,794	
GRAND TOTAL FOR WALLS					\$1,223,473	

INSTALL STAIRS AND ELEVATOR						
Install strip footings						
Excavate, form, and pour strip footings	90	LF	\$25.25	\$2,272	A1.1-140-2500	97 Assembly p. 4
				Total	\$2,272	
Install walls						
Install brick walls for stairwell and elevator shaft	4,320	SF	\$25.52	\$110,246	A4.1-273-1020	97 Assembly p. 175 + 10% historic matching
				Total	\$110,246	
Install stairs						
Form and pour stairs	4	FL	\$2,950.00	\$11,800	A3.9-100-0550	97 Assembly p. 127
				Total	\$11,800	
Install elevator						
Install elevator	1	EA	\$65,200.00	\$65,200	A7.1-100-1400	97 Assembly p. 256
				Total	\$65,200	
GRAND TOTAL FOR CONVEYANCES					\$189,519	
SUBTOTAL				\$3,865,378		
City cost index				128%		
TOTAL					\$4,939,953	
TOTAL with contingency of:			10%		\$5,433,948	
TOTAL with contingency of:			30%		\$6,421,938	
ROUNDED TO					\$5,434,000	
ROUNDED TO					\$6,422,000	

Internal Roadways and On-Street Parking

Table C7A. Internal roadway parking estimate for Wooley Avenue (in 1997 dollars).

Widen Wooley Ave. to include parking		180	Stalls			
SOW: Remove existing Wooley Ave and additional land to reinstall Wooley Avenue with head on parking						
Action	Quantity	UOM	Cost/unit	Total Cost	Means Ref. No.	Book
Demolition						
Remove top soil	1,111	CY	\$0.89	\$989	029-204-1400	97 Site p 113
Remove existing road	2,667	SY	\$6.70	\$17,867	020-554-1750	97 Site
Remove parts of existing curb and gutter	66	LF	\$3.28	\$216	020-554-2400	97 Site p 28
Rubbish handling	1,622	CY	\$13.30	\$21,567	020-620-3080	97 Site
Haul debris to dump	1,622	CY	\$6.30	\$10,216	020-620-5000	97 Site p 29
Disposal fee for debris	1,622	CY	\$6.00	\$9,729	020-612-0320	97 Site
Total					\$60,584	
Install						
Grade soil	6,000	SY	\$0.72	\$4,320	0225-122-1020	97 Site p 63
Install and compact crushed stone base material	6,000	SY	\$6.95	\$41,700	022-308-0100	97 Site p 48
Excavate for curb and gutter	153	CY	\$4.53	\$693	022-254-0090	97 Site
Install curb and gutter	2,108	LF	\$8.90	\$18,761	025-025-0448	97 Site
Install catch basins	22	EA	\$1,535.00	\$33,770	A12.3-710-5820	97 Site p 365
Install pipe to connect basins	2,551	LF	\$5.30	\$13,520	027-108-3020	97 Site p 87
Install 3" binder course	6,000	SY	\$5.30	\$31,800	025-104-0160	97 Site p 62
Install 3" wearing course	6,000	SY	\$6.15	\$36,900	025-104-0460	97 Site p 62
Compaction of 6" asphalt surface	1,000	CY	\$0.47	\$470	025-226-5020	
Total					\$181,934	
Finish and landscaping						
Layout of pavement marking	7,200	LF	\$0.04	\$288	025-804-0790	97 Site p 70
Paint parking stalls (Thermoplastic paint)	180	EA	\$4.39	\$790	025-804-0800	97 Site p 70
Paint parking stalls-handicap stalls	4	EA	\$80.50	\$322	025-804-1200	97 Site p 70
Install wheel stops	180	EA	\$31.50	\$5,670	028-408-1000	97 Site p 108
Layout of directional arrows	60	SF	\$4.61	\$277	025-804-0760	97 Site
Install directional arrows	60	SF	\$4.61	\$277	025-804-0760	97 Site
Install sod	5	MSF	\$505.00	\$2,727	029-316-0300	97 Site p 116
Install trees and pit	45	EA	\$100.07	\$4,503	A12.7-421-0000 /R029-540	97 Site

Install site lighting	14	EA	\$2,255.00	\$31,570	A12.7-500-3120	97 Site p 397
Total					\$46,424	
SUBTOTAL				\$288,942	\$288,942	
City cost index	128%				\$0	
TOTAL				\$369,267		
TOTAL with contingency of:			10%	\$406,194		
TOTAL with contingency of:			30%	\$480,048		
<u>ROUNDED TO</u>				<u>\$406,000</u>		
<u>ROUNDED TO</u>				<u>\$480,000</u>		

Table C7B. Internal roadway parking estimate for Talcott Avenue (in 1997 dollars).

Widen Talcott to include parking		115	Stalls			
SOW: Remove and/or existing Talcott Street and additional land to reinstall Talcott Street as a four lane divided road with parallel parking						
Action	Quantity	UOM	Cost/unit	Total Cost	Means Ref. No.	Book
Demolition						
Remove top soil	339	CY	\$0.89	\$302	029-204-1400	97 Site p 113
Remove existing road	4,492	SY	\$6.70	\$30,094	020-554-1750	97 Site
Remove existing curb and gutter	2,950	LF	\$3.28	\$9,676	020-554-2400	97 Site p 28
Rubbish handling	1,155	CY	\$13.30	\$15,363	020-620-3080	97 Site
Haul debris to dump	1,155	CY	\$6.30	\$7,277	020-620-5000	97 Site p 29
Disposal fee for debris	1,155	CY	\$6.00	\$6,931	020-612-0320	97 Site
Total					\$69,644	
Install						
Grade soil	5,508	SY	\$0.72	\$3,966	0225-122-1020	97 Site p 63
Install and compact crushed stone base material	5,508	SY	\$6.95	\$38,283	022-308-0100	97 Site p 48
Excavate for curb and gutter	450	CY	\$4.53	\$2,039	022-254-0090	97 Site
Install curb and gutter	3,100	LF	\$8.90	\$27,590	025-025-0448	97 Site
Install catch basins	33	EA	\$1,535.00	\$50,655	A12.3-710-5820	97 Site p 365
Install pipe to connect basins	3,751	LF	\$5.30	\$19,880	027-108-3020	97 Site p 87
Install 3" binder course	3,833	SY	\$5.30	\$20,317	025-104-0160	97 Site p 62
Install 3" wearing course	3,833	SY	\$6.15	\$23,575	025-104-0460	97 Site p 62

Compaction of 6" asphalt surface	639	CY	\$0.48	\$307	022-226-5020	96 Fac p 60
Total					\$186,612	
Finish						
Layout of pavement marking	4,600	LF	\$0.04	\$184	025-804-0790	97 Site p 70
Paint parking stalls (Thermoplastic paint)	115	EA	\$4.39	\$505	025-804-0800	97 Site p 70
Install wheel stops	115	EA	\$31.50	\$3,622	028-408-1000	97 Site p 108
Install sod	3	MSF	\$505.00	\$1,742	029-316-0300	97 Site p 116
Install trees and pit	29	EA	\$100.07	\$2,877	A12.7-421-0000 /R029-540	97 Site
Install site lighting	4	EA	\$2,255.00	\$9,020	A12.7-500-3120	97 Site p 397
Total					\$17,951	
SUBTOTAL				\$274,206	\$274,206	
City cost index				128%		
TOTAL				\$350,435		
TOTAL with contingency of:			10%	\$385,479		
TOTAL with contingency of:			30%	\$455,566		
ROUNDED TO				\$385,000		
ROUNDED TO				\$456,000		

Table C7C. Internal roadway parking estimate for Thompson Avenue (in 1997 dollars).

Widen Thompson Road into parking		40	Stalls			
SOW: Remove existing Thompson Street and additional land to reinstall Thompson Street with head-on parking						
Action	Quantity	UOM	Cost/unit	Total Cost	Means Ref. No.	Book
Demolition						
Remove top soil	293	CY	\$0.89	\$261	029-204-1400	97 Site p 113
Remove existing road	440	SY	\$6.70	\$2,948	020-554-1750	97 Site
Remove parts of existing curb and gutter	12	LF	\$3.28	\$39	020-554-2400	97 Site p 28
Rubbish handling	379	CY	\$13.30	\$5,035	020-620-3080	97 Site
Haul debris to dump	379	CY	\$6.30	\$2,385	020-620-5000	97 Site p 29
Disposal fee for debris	379	CY	\$6.00	\$2,271	020-612-0320	97 Site
Total					\$12,939	

Install						
Grade soil	1,320	SY	\$0.72	\$950	0225-122-1020	97 Site p 63
Install and compact crushed stone base material	1,320	SY	\$6.95	\$9,174	022-308-0100	97 Site p 48
Excavate for curb and gutter	36	CY	\$4.53	\$162	022-254-0090	97 Site
Install curb and gutter	492	LF	\$8.90	\$4,379	025-025-0448	97 Site
Install catch basins	6	EA	\$1,535.00	\$9,210	A12.3-710-5820	97 Site p 365
Install pipe to connect basins	595	LF	\$5.30	\$3,154	027-108-3020	97 Site p 87
Install 3" binder course	1,320	SY	\$5.30	\$6,996	025-104-0160	97 Site p 62
Install 3" wearing course	1,320	SY	\$6.15	\$8,118	025-104-0460	97 Site p 62
Compaction of 6" asphalt surface	220	CY	\$0.47	\$103	025-226-5020	
Total					\$42,246	
Finish and landscaping						
Layout of pavement marking	1,600	LF	\$0.04	\$64	025-804-0790	97 Site p 70
Paint parking stalls (Thermoplastic paint)	40	EA	\$4.39	\$176	025-804-0800	97 Site p 70
Paint parking stalls-handicap stalls	1	EA	\$80.50	\$80	025-804-1200	97 Site p 70
Install wheel stops	40	EA	\$31.50	\$1,260	028-408-1000	97 Site p 108
Layout of directional arrows	60	SF	\$4.61	\$277	025-804-0760	97 Site
Install directional arrows	60	SF	\$4.61	\$277	025-804-0760	97 Site
Install sod	1	MSF	\$505.00	\$600	029-316-0300	97 Site p 116
Install trees and pit	10	EA	\$100.07	\$1,001	A12.7-421-0000/ R029-540	97 Site
Install site lighting	3	EA	\$2,255.00	\$6,765	A12.7-500-3120	97 Site p 397
Total					\$10,499	
SUBTOTAL						
				\$65,684	\$65,684	
City cost index				128%		
TOTAL				\$83,944		
TOTAL with contingency of:						
			10%	\$92,339		
TOTAL with contingency of:			30%	\$109,128		
ROUNDED TO						
				\$92,000		
ROUNDED TO				\$109,000		

Table C7D. Internal roadway parking estimate for Craig Avenue (in 1997 dollars).

Widen Craig to include parking		103	Stalls			
SOW: Remove existing Craig Street and additional land to reinstall Craig Street with head on parking						
Action	Quantity	UOM	Cost/unit	Total Cost	Means Ref. No.	Book
Demolition						
Remove top soil	0	CY	\$0.89	\$0	029-204-1400	97 Site p 113
Remove existing road	2,040	SY	\$6.70	\$13,668	020-554-1750	97 Site
Remove parts of existing curb and gutter	50	LF	\$3.28	\$166	020-554-2400	97 Site p 28
Rubbish handling	390	CY	\$13.30	\$5,194	020-620-3080	97 Site
Haul debris to dump	390	CY	\$6.30	\$2,460	020-620-5000	97 Site p 29
Disposal fee for debris	390	CY	\$6.00	\$2,343	020-612-0320	97 Site
Total					\$23,830	
Install						
Grade soil	2,040	SY	\$0.72	\$1,469	0225-122-1020	97 Site p 63
Install and compact crushed stone base material	2,040	SY	\$6.95	\$14,178	022-308-0100	97 Site p 48
Excavate for curb and gutter	119	CY	\$4.53	\$539	022-254-0090	97 Site
Install curb and gutter	1,638	LF	\$8.90	\$14,578	025-025-0448	97 Site
Install catch basins	17	EA	\$1,535.00	\$26,095	A12.3-710-5820	97 Site p 365
Install pipe to connect basins	1,982	LF	\$5.30	\$10,506	027-108-3020	97 Site p 87
Install 3" binder course	4,590	SY	\$5.30	\$24,327	025-104-0160	97 Site p 62
Install 3" wearing course	4,590	SY	\$6.15	\$28,228	025-104-0460	97 Site p 62
Compaction of 6" asphalt surface	765	CY	\$0.47	\$360	025-226-5020	
Total					\$120,279	
Finish and landscaping						
Layout of pavement marking	4,120	LF	\$0.04	\$165	025-804-0790	97 Site p 70
Paint parking stalls (Thermoplastic paint)	103	EA	\$4.39	\$452	025-804-0800	97 Site p 70
Paint parking stalls-handicap stalls	2	EA	\$80.50	\$161	025-804-1200	97 Site p 70
Install wheel stops	103	EA	\$31.50	\$3,244	028-408-1000	97 Site p 108
Layout of directional arrows	60	SF	\$4.61	\$277	025-804-0760	97 Site
Install directional arrows	60	SF	\$4.61	\$277	025-804-0760	97 Site
Install sod	4	MSF	\$505.00	\$2,086	029-316-0300	97 Site p 116
Install trees and pit	26	EA	\$100.07	\$2,577	A12.7-421-0000/ R029-540	97 Site
Install site lighting	10	EA	\$2,255.00	\$22,550	A12.7-500-3120	97 Site p 397
Total					\$31,789	

SUBTOTAL				\$175,898	\$175,898	
City cost index	128%					
TOTAL				\$224,798		
TOTAL with contingency of:		10%		\$247,278		
TOTAL with contingency of:		30%		\$292,237		
ROUNDED TO				\$247,000		
ROUNDED TO				\$292,000		

Table C8. Initial surface parking estimate (in 1997 dollars).

Repair existing parking lots		233	stalls			
SOW: Repair bad sections of parking lot (est 10% of total) and curb and gutter (est 10% of total) and apply a slurry seal over the remaining lots						
Action	Quantity	UOM	Cost/unit	Total Cost	Means Ref. No.	Book
Demolition						
Remove parts of existing curb and gutter	83	LF	\$3.28	\$274	020-554-2400	97 Site p 28
Remove parts of existing parking lots	483	SY	\$6.70	\$3,234	020-554-1750	97 Site p 28
Rubbish handling	566	CY	\$13.30	\$7,531	020-620-3080	97 Site
Haul debris to dump	566	CY	\$6.30	\$3,567	020-620-5000	97 Site p 29
Disposal fee for debris	566	CY	\$6.00	\$3,397	020-612-0320	97 Site p 29
Total					\$18,003	
Install new curb and gutter						
Excavate for curb and gutter	92	CY	\$4.97	\$456	022-254-0500	97 Site
Install curb and gutter	1265	LF	\$8.90	\$11,260	025-025-0448	97 Site
Install catch basins	22	EA	\$1,535.00	\$33,770	A12.3-710-5820	97 Site p 365
Install pipe to connect basins	1,392	LF	\$5.30	\$7,376	027-108-3020	97 Site p 87
Total					\$52,862	
Chip seal existing parking lots						
Sweep and remove debris	70	MSF	\$2.15	\$150	029-710-6420	97 Site p 119
Repair potholes & damages (10% of existing)	1,107	SY	\$12.90	\$14,287	029-710-5913	97 Site p 119
Seal random cracks (10% of existing)	1,107	SY	\$10.20	\$11,296	025-458-3280	97 Site p 68
Install chip seal	7,754	SY	\$3.39	\$26,285	025-458-2350	97 Site p 68
Total					\$52,018	

Finish and landscaping						
Layout of parking stalls	9,320	LF	\$0.04	\$373	025-804-0790	97 Site p 70
Paint parking stalls (Thermoplastic paint)	233	EA	\$4.39	\$1,023	025-804-0800	97 Site p 70
Paint parking stalls-handicap stalls	5	EA	\$80.50	\$402	025-804-1200	97 Site p 70
Install wheel stops	233	EA	\$31.50	\$7,340	028-408-1000	97 Site p 108
Layout of directional arrows	480	SF	\$4.61	\$2,213	025-804-0760	97 Site
Install directional arrows	480	SF	\$4.61	\$2,213	025-804-0760	97 Site
Install trees w/ pit	60	EA	\$100.07	\$6,004	A12.7-421-0000/ R029-540	97 Site
Install site lighting	19	EA	\$2,255.00	\$42,845	A12.7-500-3120	97 Site p 397
Install sod	7	MSF	\$505.00	\$3,524	029-316-0300	97 Site p 116
Total					\$65,937	
SUBTOTAL				\$188,820	\$188,820	
City cost index	128%					
TOTAL				\$197,883		
TOTAL with contingency of:		10%		\$217,672		
TOTAL with contingency of:		30%		\$257,248		
ROUNDED TO				\$218,000		
ROUNDED TO				\$257,000		

Table C9. All surface parking estimate (in 1997 dollars).

Repair existing parking lots with an overlay		866	Stalls	Head on parking		
SOW: Repair bad sections of parking lot (est 10% of total) and curb and gutter (est 10% of total) and then apply a 3" overlay						
Action	Quantity	UOM	Cost/unit	Total Cost	Means Ref. No.	Book
Demolition						
Remove damaged curb and gutter	1,065	LF	\$3.28	\$3,493	020-554-2400	97 Site p 28
Rubbish handling	70	CY	\$13.30	\$935	020-620-3080	97 Site
Haul debris to dump	70	CY	\$6.30	\$443	020-620-5000	97 Site p 29
Disposal fee for debris	70	CY	\$6.00	\$422	020-612-0320	97 Site p 29
Total					\$5,293	

<i>Install new curb and gutter</i>						
Excavate for curb and gutter	77	CY	\$4.97	\$384	022-254-0500	97 Site
Install curb and gutter	1065	LF	\$8.90	\$9,478	025-025-0448	97 Site
Install catch basins	30	EA	\$1,535.00	\$46,050	A12.3-710-5820	97 Site p 365
Install pipe to connect basins	1,172	LF	\$5.30	\$6,209	027-108-3020	97 Site p 87
Total					\$62,122	
<i>Overlay existing parking lots</i>						
Sweep and remove debris	260	MSF	\$2.15	\$558	029-710-6420	97 Site p 119
Repair potholes & damages (10% of existing)	2,885	SY	\$12.90	\$37,216	029-710-5913	97 Site p 119
Repair cracks with flooding (10% of existing)	2,885	SY	\$4.61	\$13,300	025-458-3320	97 Site p 68
Install overlay of 1-1/2" binder course	28,850	SY	\$2.82	\$81,357	025-104-0080	97 Site p 62
Install overlay of 1-1/2" wearing course	28,850	SY	\$3.27	\$94,340	025-104-0340	97 Site p 68
Compaction of surface	2,404	CY	\$0.48	\$1,154	022-226-5020	
Total					\$227,925	
<i>Finish and landscaping</i>						
Layout of parking stalls	34,640	LF	\$0.04	\$1,386	025-804-0790	97 Site p 70
Paint parking stalls (Thermoplastic paint)	866	EA	\$4.39	\$3,802	025-804-0800	97 Site p 70
Paint parking stalls-handicap stalls	17	EA	\$80.50	\$1,368	025-804-1200	97 Site p 70
Install wheel stops	866	EA	\$31.50	\$27,279	028-408-1000	97 Site p 108
Layout of directional arrows	1,080	SF	\$4.61	\$4,979	025-804-0760	97 Site
Install directional arrows	1,080	SF	\$4.61	\$4,979	025-804-0760	97 Site
Install sod	26	MSF	\$505.00	\$13,112	029-316-0300	97 Site p 116
Install trees and pit	220	EA	\$100.07	\$22,015	A12.7-421-0000/ R029-540	97 Site
Install site lighting	67	EA	\$2,255.00	\$151,085	A12.7-500-3120	97 Site p 397
Total					\$230,005	
SUBTOTAL						
				\$525,345	\$525,345	
City cost index	128%					
TOTAL				\$671,390		
TOTAL with contingency of:						
			10%	\$738,529		
TOTAL with contingency of:			30%	\$872,808		
ROUNDED TO						
				\$739,000		
ROUNDED TO				\$873,000		

Building Fit-Up

Table C10. Definitions and Assumptions to calculate developable square feet.

Definitions:				
Use:	Facility function as defined in the Reuse Plan.			
EDC Developable Area:	Area available for development as defined in the Reuse Plan.			
Gross Area:	Gross square foot of modified facility based on reuse concept.			
Net Developable Area:	Net square foot of modified facility based on reuse concept.			
Mechanical Area:	Estimated area for mechanical equipment.			
R&D Assignable Area:	Square foot of R&D assignable area as defined by Timesaver Standards for Building Types, p1165.			
Office Rentable Area:	Square foot of office rentable area as defined by Timesaver Standards for Building Types, p879.			
Public Circ/Toilets/Jan/Duct:	Estimated area required for major circulation, public toilets, janitorial functions, and HVAC distribution.			
Occupancy:	CERL projected occupancy based on use and R&D Assignable/Office Rentable areas.			
Foot Print:	Gross square foot of existing facility ground floor footprint measured from AutoCAD drawings.			
EDC Foot Print:	Gross square foot of existing facility ground floor footprint measured from EDC documentation.			
Reuse Concept Description:	Verbal description of the proposed facility "revitalization."			
Assumptions:				
Elevators:	25000	1 elevator per 25000 SF of rentable area beyond 1st floor - Timesaver Standards for Building Types, p879		
R&D	391	SF/person	Timesaver Standards for Building Types, p1165	
Office	200	SF/person	Timesaver Standards for Building Types, p879	
Mechanical	7.00%	of Gross SF	US Army Corps, Seattle District	
Structural	5.00%	of Gross SF	US Army Corps, Seattle District	
Efficiency of R&D Assignable Area	65.00%	of Net Developable		
Efficiency of Office Rentable Area	77.00%	of Net Developable		
Capacity per Unit Egress Width	0.3	inches of stairway per occupant round up to 4ft increments, Means Assemblies 1995, p.516		

Table C11. AMTL building fit-up cost estimate roll-up report.

Building	311		37		313		312	
Area Data From:	CERL	EDC	CERL	EDC	CERL	EDC	CERL	EDC
Occupancy	876	841	114	149	131	185	104	179
Office								
SF	158,983	152,500	17,460	27,000	15,925	33,500	12,464	32,500
25% Contingency	\$12,762,021	\$12,124,083	\$853,832	\$1,464,578	\$973,940	\$1,580,111	\$763,164	\$1,594,346
Cost/SF	\$80.27	\$79.50	\$48.90	\$54.24	\$61.16	\$47.17	\$61.23	\$49.06
50% Contingency	\$15,314,425	\$14,548,899	\$1,024,598	\$1,757,494	\$1,168,728	\$1,896,133	\$915,796	\$1,913,216
Cost/SF	\$96.33	\$95.40	\$58.68	\$65.09	\$73.39	\$56.60	\$73.47	\$58.87
R&D								
SF	158,983	152,500	17,460	27,000	15,925	33,500	12,464	32,500
25% Contingency	\$12,762,021	\$12,124,083	\$853,832	\$1,464,578	\$973,940	\$1,580,111	\$763,164	\$1,594,346
Cost/SF	\$80.27	\$79.50	\$48.90	\$54.24	\$61.16	\$47.17	\$61.23	\$49.06
50% Contingency	\$15,314,425	\$14,548,899	\$1,024,598	\$1,757,494	\$1,168,728	\$1,896,133	\$915,796	\$1,913,216
Cost/SF	\$96.33	\$95.40	\$58.68	\$65.09	\$73.39	\$56.60	\$73.47	\$58.87
Manufacturing								
SF			6,306		15,499		12,700	
25% Contingency			\$210,210		\$516,659		\$423,354	
Cost/SF			\$33.33		\$33.33		\$33.33	
50% Contingency			\$252,252		\$619,991		\$508,025	
Cost/SF			\$40.00		\$40.00		\$40.00	
Totals								
SF	317,966	305,000	41,226	54,000	47,348	67,000	37,629	65,000
25% Contingency	\$25,524,042	\$24,248,166	\$1,917,874	\$2,929,157	\$2,464,539	\$3,160,222	\$1,949,682	\$3,188,693
Cost/SF	\$80.27	\$79.50	\$46.52	\$54.24	\$52.05	\$47.17	\$51.81	\$49.06
50% Contingency	\$30,628,851	\$29,097,799	\$2,301,448	\$3,514,988	\$2,957,447	\$3,792,266	\$2,339,618	\$3,826,431
Cost/SF	\$96.33	\$95.40	\$55.82	\$65.09	\$62.46	\$56.60	\$62.18	\$58.87
Building	43		97		292		131	
Area Data From:	CERL	EDC	CERL	EDC	CERL	EDC	CERL	EDC
Occupancy	91	116	58	41	68	69	154	127
Office								
SF	16,499	21,000	10,450	7,500	12,375	12,500	27,961	23,000
25% Contingency	\$1,350,435	\$1,510,177	\$1,034,441	\$666,824	\$556,203	\$561,668	\$1,238,782	\$1,101,474
Cost/SF	\$81.85	\$71.91	\$98.99	\$88.91	\$44.95	\$44.93	\$44.30	\$47.89
50% Contingency	\$1,620,522	\$1,812,213	\$1,241,329	\$800,189	\$667,444	\$674,002	\$1,486,539	\$1,321,769
Cost/SF	\$98.22	\$86.30	\$118.79	\$106.69	\$53.93	\$53.92	\$53.16	\$57.47

R&D								
SF	16,499	21,000	10,450	7,500	12,375	12,500	27,961	23,000
25% Contingency	\$1,350,435	\$1,510,177	\$1,034,441	\$666,824	\$556,203	\$561,668	\$1,238,782	\$1,101,474
Cost/SF	\$81.85	\$71.91	\$98.99	\$88.91	\$44.95	\$44.93	\$44.30	\$47.89
50% Contingency	\$1,620,522	\$1,812,213	\$1,241,329	\$800,189	\$667,444	\$674,002	\$1,486,539	\$1,321,769
Cost/SF	\$98.22	\$86.30	\$118.79	\$106.69	\$53.93	\$53.92	\$53.16	\$57.47
Totals								
SF	32,998	42,000	20,900	15,000	24,750	25,000	55,922	46,000
25% Contingency	\$2,700,870	\$3,020,355	\$2,068,882	\$1,333,648	\$1,112,406	\$1,123,337	\$2,477,564	\$2,202,949
Cost/SF	\$81.85	\$71.91	\$98.99	\$88.91	\$44.95	\$44.93	\$44.30	\$47.89
50% Contingency	\$3,241,044	\$3,624,426	\$2,482,658	\$1,600,378	\$1,334,888	\$1,348,004	\$2,973,077	\$2,643,538
Cost/SF	\$98.22	\$86.30	\$118.79	\$106.69	\$53.93	\$53.92	\$53.16	\$57.47
TOTALS	CERL 25%	EDC 25%	CERL 50%	EDC 50%	CERL SF	EDC SF	CERL OCC	EDC OCC
Grand Total	\$40,215,860	\$41,206,526	\$48,259,032	\$49,447,831	578,740	619,000	1,595	1,706
Office Total	\$19,532,818	\$20,603,263	\$23,439,382	\$24,723,916	272,117	309,500		
R&D Total	\$19,532,818	\$20,603,263	\$23,439,382	\$24,723,916	272,117	309,500		
Manufacture Total	\$1,150,223	\$0	\$1,380,268	\$0	34,505	0		
Total/SF	\$69.49	\$66.57	\$83.39	\$79.88				
Office/SF	\$71.78	\$66.57	\$86.14	\$79.88				
R&D/SF	\$71.78	\$66.57	\$86.14	\$79.88				
Manufacture/SF	\$33.33		\$40.00					

Table C12. Building 311 developable square footage and building fit-up cost.

Building 311 - Sea Coast & Carriage Erecting Shop/Prototype Machine Shop				
	Use:	CERL SF	Unit	EDC SF Unit
Gross Area:		361,325 SF		346,591 SF
Net Developable Area:		317,966 SF		305,000 SF
Mechanical Area:		25,293 SF		24,261 SF 7.00% of Net Developable
Structure Area:		18,066 SF		17,330 SF 5.00% of Net Developable
R&D Assignable Area:		103,339 SF		99,125 SF 65.00% 391 SF/person
Office Rentable Area:		122,417 SF		117,425 SF 77.00% 200 SF/person
Occupancy:		876		841
Existing Area:		146,362 SF		154,800 SF
CERL Reuse Concept "Infill" interior volume with a partial two-story, partial three-story office/R&D facility;				
Description: fit-up to include: structure, class B tenant space; renovation to include repair of the exterior envelope; and demolition to include removal of all interior offices, labs, mezzanine construction, and cranes.				

Fit-up Cost Estimate	Quantity	Unit	Quantity	Unit	Cost/Unit	CERL Cost	EDC Cost
Major Mechanicals/Utilities						\$0	\$0
Fire Protection	343,259 SF		329,261 SF		\$5.39	\$1,850,726	\$1,775,257
Plumbing	317,966 SF		305,000 SF		\$5.60	\$1,781,950	\$1,709,285
HVAC	317,966 SF		305,000 SF		\$10.12	\$3,216,361	\$3,085,204
Electrical	317,966 SF		305,000 SF		\$6.56	\$2,085,100	\$2,000,074
Interior Construction						\$0	\$0
Office Lighting	225,756 SF		216,550		\$8.30	\$1,873,868	\$1,797,455
Office/R&D Office	225,756 SF		216,550		\$12.84	\$2,898,486	\$2,780,291
Construction							
Restroom Group	25 EA		24 EA		\$2,658.32	\$66,458	\$63,800
Floor structure	214,963 SF		191,791 SF		\$18.83	\$4,048,544	\$3,612,129
4" Concrete 1st floor	146,362 SF		154,800 SF		\$3.49	\$511,348	\$540,828
3 Stairs	18 EA		18 EA		\$3,710.46	\$66,788	\$66,788
Interior Demolition						\$0	\$0
Crane Removal	12 EA		12 EA		\$10,000.00	\$120,000	\$120,000
40% In Plant Offices	58,545 SF		61,920 SF		\$3.80	\$222,470	\$235,296
Raised Platens	8,125 SF		8,125 SF		\$4.00	\$32,500	\$32,500
Elevator 3 stop	7 EA		6 EA		\$65,010.59	\$455,074	\$390,064
Exterior Envelope Repairs						\$0	\$0
Brick Cleaning (removal of efflorescence)	14,828 SF		14,828 SF		\$0.71	\$10,502	\$10,502
40% Window Restoration	39,694 SF		39,694 SF		\$25.00	\$992,360	\$992,360
Clerestory Restoration	7,468 SF		7,468 SF		\$25.00	\$186,700	\$186,700
Total Office	158,983 SF		152,500 SF			\$10,209,617	\$9,699,266
Total R&D	158,983 SF		152,500 SF			\$10,209,617	\$9,699,266
Total Manufacturing	0 SF		0 SF				

Table C13. Building 37 developable square footage and building fit-up cost.

Building 37 - Timber Storehouse West/Workshop-Motor Pool				
	CERL SF	Unit	EDC SF	Unit
Gross Area:	46,848 SF		61,364 SF	
Net Developable Area:	41,226 SF		54,000 SF	
Mechanical Area:	3,279 SF		4,295 SF	7.00% of Net Developable
Structure Area:	2,342 SF		3,068 SF	5.00% of Net Developable
R&D Assignable Area:	13,399 SF		17,550 SF	65.00% 391 SF/person
Office Rentable Area:	15,872 SF		20,790 SF	77.00% 200 SF/person
Occupancy:	114		149	

Existing Area:	43,673 SF	36,271 SF					
CERL Reuse Concept	"Infill" 2/3 of high bay with two-story, leave 1 crane in west 1/3 of high bay 6306 SF,						
Description:	office/R&D facility, refurbish north shed and south gabled 2 nd & 3 rd floors; fit-up to include: structure, unfinished floor, basic utilities; renovation to include repair of the exterior envelope; and demolition to include removal of all interior offices, labs, partitions and cranes.						
Fit-up Cost Estimate	Quantity	Unit	Quantity	Unit	Cost/Unit	CERL Cost	EDC Cost
Major Mechanicals/Utilities						\$0	\$0
Fire Protection	44,506 SF		58,295 SF		\$5.39	\$239,958	\$314,308
Plumbing	34,920 SF		54,000 SF		\$5.60	\$195,701	\$302,628
HVAC	34,920 SF		54,000 SF		\$10.12	\$353,233	\$546,233
Electrical	34,920 SF		54,000 SF		\$6.56	\$228,994	\$354,111
Interior Construction						\$0	\$0
Restroom Group	6 EA		6 EA		\$2,658.32	\$15,950	\$15,950
Floor structure	3,175 SF		25,093 SF		\$18.83	\$59,797	\$472,587
3 Stairs	3 EA		3 EA		\$3,710.46	\$11,131	\$11,131
Interior Demolition						\$0	\$0
Crane Removal	1 EA		1 EA		\$10,000.00	\$10,000	\$10,000
Elevators	0 EA		1 EA		\$65,010.59	\$0	\$65,011
Exterior Envelope Repairs						\$0	\$0
Brick Removal	4,421 SF		4,421 SF				
Brick Cleaning	18,576 SF		18,576 SF		\$0.71	\$13,156	\$13,156
New Window	9,528 SF		9,528 SF		\$25.00	\$238,211	\$238,211
Roof Replacement & Insulation	29,032 SF		29,032 SF				
Skylight Replacement	3,476 SF		3,476 SF				
Partial Demolition							
Special Manufacturing							
HVAC Special Manufacturing	6,306 SF				\$7.18	\$45,304	\$0
Special Manufacturing	6,306 SF				\$6.63	\$41,829	\$0
Electrical Upgrade							
Special Manufacturing	6,306 SF				\$6.21	\$39,150	\$0
Lighting							
Plumbing Special	6,306 SF				\$6.64	\$41,886	\$0
Manufacturing							
Total Office	17,460 SF		27,000 SF			\$683,065	\$1,171,663
Total R&D	17,460 SF		27,000 SF			\$683,065	\$1,171,663
Total Manufacturing	6,306 SF		SF			\$168,168	\$0

Table C14. Building 313 developable square footage and building fit-up cost.

Building 313N&S - Carriage & Machine Shop/Laboratory						
	Use: CERL SF	Unit	EDC SF	Unit		
Gross Area:	53,805 SF		76,136 SF			
Net Developable Area:	47,348 SF		67,000 SF			
Mechanical Area:	3,766 SF		5,330 SF		7.00% of Net Developable	
Structure Area:	2,690 SF		3,807 SF		5.00% of Net Developable	
R&D Assignable Area:	15,388 SF		21,775 SF		65.00%	391 SF/person
Office Rentable Area:	18,229 SF		25,795 SF		77.00%	200 SF/person
Occupancy:	131		185			
Existing Area:	53,805 SF		43,600 SF			
CERL Reuse Concept "Refurbish existing facility leaving existing configuration essentially intact. 313N						
Description: and N-S connecting pavilion to remain two story office/R&D space. 313S to remain high bay 15499 SF. 313C to be demolished. Restroom facilities currently in the center area are to be rebuilt in other areas as required. Existing cranes in 313S are to remain to service the "specialized manufacturing" function.						
Fit-up Cost Estimate	Quantity	Unit	Quantity	Unit	Cost/Unit	CERL Cost EDC Cost
Major Mechanicals/Utilities						\$0 \$0
Fire Protection	51,115 SF		72,330 SF		\$5.39	\$275,592 \$389,975
Plumbing	31,849 SF		67,000 SF		\$5.60	\$178,491 \$375,482
HVAC	31,849 SF		67,000 SF		\$10.12	\$322,170 \$677,733
Electrical	31,849 SF		67,000 SF		\$6.56	\$208,856 \$439,360
Interior Construction						\$0 \$0
2 Stairs	0 EA		2 EA		\$3,710.46	\$0 \$7,421
Elevators	0 EA		1 EA		\$65,010.59	\$0 \$65,011
Exterior Envelope Repairs						\$0 \$0
Brick Removal	2,879 SF		2,879 SF		\$0	
New Window	12,662 SF		12,662 SF		\$25.00	\$316,539 \$316,539
Marketability	37,306 SF		37,306 SF		\$6.88	\$256,657 \$256,657
Special Manufacturing						
HVAC Special Manufacturing	15,499 SF				\$7.18	\$111,349 \$0
Special Manufacturing	15,499 SF				\$6.63	\$102,807 \$0
Electrical Upgrade						
Special Manufacturing Lighting	15,499 SF				\$6.21	\$96,224 \$0
Plumbing Special	15,499 SF				\$6.64	\$102,947 \$0
Manufacturing						
Total Office	15,925 SF		33,500 SF			\$779,152 \$1,264,089
Total R&D	15,925 SF		33,500 SF			\$779,152 \$1,264,089
Total Manufacturing	15,499 SF		SF			\$413,327 \$0

Table C15. Building 312 developable square footage and building fit-up cost.

Building 312 - Erecting Shop/Laboratory							
	Use:	CERL SF	Unit	EDC SF	Unit		
Gross Area:		42,760 SF		73,864 SF			
Net Developable Area:		37,629 SF		65,000 SF			
Mechanical Area:		2,993 SF		5,170 SF		7.00% of Net Developable	
Structure Area:		2,138 SF		3,693 SF		5.00% of Net Developable	
R&D Assignable Area:		12,229 SF		21,125 SF		65.00%	391 SF/person
Office Rentable Area:		14,487 SF		25,025 SF		77.00%	200 SF/person
Occupancy:		104		179			
Existing Area:		42,760 SF		43,600 SF			
CERL Reuse Concept "Restore" only. Leave crane. Remove infill in high bay. Remove partitions 1 st floor							
Description: south.							
Fit-up Cost Estimate	Quantity	Unit	Quantity	Unit	Cost/Unit	CERL Cost	EDC Cost
Major Mechanicals/Utilities						\$0	\$0
Fire Protection	40,622 SF		70,170 SF		\$5.39	\$219,019	\$378,334
Plumbing	24,929 SF		65,000 SF		\$5.60	\$139,706	\$364,274
HVAC	24,929 SF		65,000 SF		\$10.12	\$252,165	\$657,503
Electrical	24,929 SF		65,000 SF		\$6.56	\$163,474	\$426,245
Interior Construction						\$0	\$0
Restroom Group	2 EA		2 EA		\$2,658.32	\$5,317	\$5,317
Interior Demolition						\$0	\$0
In Plant Offices High Bay	12,700		12,700		\$3.80	\$48,260	\$48,260
Partition removal	10,240		10,240		\$3.80	\$38,912	\$38,912
Exterior Envelope Repairs						\$0	\$0
Infill Panel Removal	4,978 SF		4,978 SF		\$3.80	\$18,916	\$18,916
New Window	6,640 SF		6,640 SF		\$25.00	\$166,009	\$166,009
Marketability	24,606 SF		65,000 SF		\$6.88	\$169,284	\$447,185
Special Manufacturing							
HVAC Special Manufacturing	12,700 SF				\$7.18	\$91,240	\$0
Special Manufacturing	12,700 SF				\$6.63	\$84,241	\$0
Electrical Upgrade							
Special Manufacturing	12,700 SF				\$6.21	\$78,847	\$0
Lighting							
Plumbing Special	12,700 SF				\$6.64	\$84,356	\$0
Manufacturing							
Total Office	12,464 SF		32,500 SF			\$610,531	\$1,275,477
Total R&D	12,464 SF		32,500 SF			\$610,531	\$1,275,477
Total Manufacturing	12,700 SF		SF			\$338,683	\$0

Table C16. Building 43 developable square footage and building fit-up cost.

Building 43 - Smith Shop/Metallurgy Lab/Foundry							
	Use:	Office/R&D		Office/R&D			
		CERL	Unit	EDC SF	Unit		
		SF					
	Gross Area:	37,498 SF		47,727 SF			
	Net Developable Area:	32,998 SF		42,000 SF			
	Mechanical Area:	2,625 SF		3,341 SF		7.00% of Net Developable	
	Structure Area:	1,875 SF		2,386 SF		5.00% of Net Developable	
	R&D Assignable Area:	10,724 SF		13,650 SF		65.00%	391 SF/person
	Office Rentable Area:	12,704 SF		16,170 SF		77.00%	200 SF/person
	Occupancy:	91		116			
	Existing Area:	20,992 SF		20,944 SF			
	CERL Reuse Concept	Infill high bay with a two-story office/R&D facility; fit-up to include: structure,					
	Description:	unfinished floor, basic utilities; renovation to include repair of the exterior envelope; and removal of crane rail and cranes.					
Fit-up Cost Estimate		Quantity	Unit	Quantity	Unit	Cost/Unit	CERL Cost EDC Cost
Major Mechanicals/Utilities							\$0 \$0
Fire Protection		35,623	SF	45,341	SF	\$5.39	\$192,067 \$244,462
Plumbing		32,998	SF	42,000	SF	\$5.60	\$184,929 \$235,377
HVAC		32,998	SF	42,000	SF	\$10.12	\$333,791 \$424,848
Electrical		32,998	SF	42,000	SF	\$6.56	\$216,390 \$275,420
Interior Construction							\$0 \$0
Office Lighting		33,012	SF	33,012	SF	\$8.30	\$274,013 \$274,013
Office/R&D Office Construction		33,012	SF	33,012	SF	\$12.84	\$423,842 \$423,842
Restroom Group		5	EA	6	EA	\$2,658.32	\$13,292 \$15,950
Floor structure		16,506	SF	16,506	SF	\$18.83	\$310,869 \$310,869
3 Stairs		3	EA	3	EA	\$3,710.46	\$11,131 \$11,131
Interior Demolition							\$0 \$0
Crane Removal		1	EA	1	EA	\$10,000.00	\$10,000 \$10,000
Crane Rail Removal							
Elevators		1	EA	1	EA	\$65,010.59	\$65,011 \$65,011
Exterior Envelope Repairs							\$0 \$0
Infill Panel Removal Gable Ends		1,672	SF	1,672	SF	\$3.80	\$6,353 \$6,353
New Window		4,760	SF	4,760	SF	\$25.00	\$119,008 \$119,008
Roof Area for Removal/Replacement		16,200	SF	16,200	SF		\$0 \$0
Total Office		16,499	SF	21,000	SF		\$1,080,348 \$1,208,142
Total R&D		16,499	SF	21,000	SF		\$1,080,348 \$1,208,142
Total Manufacturing							

Table C17. Building 97 developable square footage and building fit-up cost.

Building 97 - Locomotive House/Laboratory							
Use:	Office/R&D		Office/R&D				
	CERL SF	Unit	EDC SF	Unit			
Gross Area:	23,750 SF		17,045 SF				
Net Developable Area:	20,900 SF		15,000 SF				
Mechanical Area:	1,663 SF		1,193 SF		7.00% of Net Developable		
Structure Area:	1,188 SF		852 SF		5.00% of Net Developable		
R&D Assignable Area:	6,793 SF		4,875 SF		65.00%	391	SF/person
Office Rentable Area:	8,047 SF		5,775 SF		77.00%	200	SF/person
Occupancy:	58		41				
Existing Area:	16,483 SF		11,286 SF				
CERL Reuse Concept Description:	Gut rooms and mechanical. Infill second floor.						
Fit-up Cost Estimate	Quantity	Unit	Quantity	Unit	Cost/Unit	CERL Cost	EDC Cost
Major Mechanicals/Utilities						\$0	\$0
Fire Protection	22,563 SF		16,193 SF		\$5.39	\$121,649	\$87,308
Plumbing	20,900 SF		15,000 SF		\$5.60	\$117,128	\$84,063
HVAC	20,900 SF		15,000 SF		\$10.12	\$211,412	\$151,731
Electrical	20,900 SF		15,000 SF		\$6.56	\$137,054	\$98,364
Interior Construction						\$0	\$0
Office Lighting	23,750 SF		15,000 SF		\$8.30	\$197,135	\$124,506
Office/R&D Office	23,750 SF		15,000 SF		\$12.84	\$304,927	\$192,585
Construction							
Restroom Group	4 EA		3 EA		\$2,658.32	\$10,633	\$7,975
Floor structure	11,875 SF		SF		\$18.83	\$223,650	\$0
3 Stairs	3 EA		EA		\$3,710.46	\$11,131	\$0
Interior Demolition						\$0	\$0
1st offices, ceiling, floor, cabinets	11,875 SF		11,875 SF		\$5.00	\$59,375	\$59,375
Mechanical equipment in 2nd floor	7,840 SF		7,840 SF		\$25.00	\$196,000	\$196,000
Elevators	1 EA		1 EA		\$65,010.59	\$65,011	\$65,011
Exterior Envelope Repairs						\$0	\$0
Brick Infill Removal	275		275 SF				
New Window	3,169		3,169 SF				
Brick Cleaning	10,277		10,277 SF				
Roof Area for	12,960		12,960 SF				
Removal/Replacement							
Partial Demolition			0				
North-east shed	573		573				
Total Office	10,450 SF		7,500 SF			\$827,553	\$533,459
Total R&D	10,450 SF		7,500 SF			\$827,553	\$533,459
Total Manufacturing							

Table C18. Building 292 developable square footage and building fit-up cost.

Building 292 - Bar Stock Storehouse/Laboratory						
Use:	Office/R&D Office/R&		D			
Gross Area:	28,125 SF	28,409 SF				
Net Developable Area:	24,750 SF	25,000 SF				
Mechanical Area:	1,969 SF	1,989 SF	7.00% of Net Developable			
Structure Area:	1,406 SF	1,420 SF	5.00% of Net Developable			
R&D Assignable Area:	8,044 SF	8,125 SF	65.00%	391 SF/person		
Office Rentable Area:	9,529 SF	9,625 SF	77.00%	200 SF/person		
Occupancy:	68	69				
Existing Area:	28,125 SF	26,400 SF				
CERL Reuse Concept Description: "Refurbish" existing facility leaving existing configuration essentially intact.						
Fit-up Cost Estimate	Quantity	Unit	Quantity	Unit	Cost/Unit	CERL Cost EDC Cost
Major Mechanicals/Utilities						\$0 \$0
Fire Protection	26,719 SF		26,989 SF		\$5.39	\$144,058 \$145,513
Plumbing	24,750 SF		25,000 SF		\$5.60	\$138,704 \$140,105
HVAC	24,750 SF		25,000 SF		\$10.12	\$250,357 \$252,886
Electrical	24,750 SF		25,000 SF		\$6.56	\$162,301 \$163,940
Interior Construction						\$0 \$0
Restroom Group	4 EA		4 EA		\$2,658.32	\$10,633 \$10,633
2 Stairs	2 EA		2 EA		\$3,710.46	\$7,421 \$7,421
Elevators	0 EA		0 EA		\$65,010.5	\$0 \$0
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Exterior Envelope Repairs						\$0 \$0
Infill Panel Removal	864 SF		864 SF			\$0
New Window	2,655 SF		2,655 SF			\$0
Brick Cleaning	8,721 SF		8,721 SF		\$0.71	\$6,177 \$6,177
Roof Area for Removal/Replacement	15,396 SF		15,396 SF			\$0
Marketability	24,750 SF		25,000 SF		\$6.88	\$170,274 \$171,994
Total Office	12,375 SF		12,500 SF			\$444,963 \$449,335
Total R&D	12,375 SF		12,500 SF			\$444,963 \$449,335
Total Manufacturing						

Table C19. Building 292 developable square footage and building fit-up cost.

Building 131 - Administration							
Use:	Office/R&D	Office/R&D					
Gross Area:	63,548 SF	52,273 SF					
Net Developable Area:	55,922 SF	46,000 SF					
Mechanical Area:	4,448 SF	3,659 SF	7.00% of Net Developable				
Structure Area:	3,177 SF	2,614 SF	5.00% of Net Developable				
R&D Assignable Area:	18,175 SF	14,950 SF	65.00%	391 SF/person			
Office Rentable Area:	21,530 SF	17,710 SF	77.00%	200 SF/person			
Occupancy:	154	127					
Existing Area:	63,548 SF	SF					
CERL Reuse Concept Description: "Refurbish" existing facility leaving existing configuration essentially intact.							
Fit-up Cost Estimate	Quantity	Unit	Quantity	Unit	Cost/Unit	CERL Cost	EDC Cost
Major Mechanicals/Utilities						\$0	\$0
Fire Protection	60,371 SF		49,659 SF		\$5.39	\$325,496	\$267,744
Plumbing	55,922 SF		46,000 SF		\$5.60	\$313,400	\$257,794
HVAC	55,922 SF		46,000 SF		\$10.12	\$565,677	\$465,310
Electrical	55,922 SF		46,000 SF		\$6.56	\$366,717	\$301,650
Interior Construction						\$0	\$0
Restroom Group	7 EA		6 EA		\$2,658.32	\$18,608	\$15,950
2 Stairs	2 EA		2 EA		\$3,710.46	\$7,421	\$7,421
Elevators	0 EA		2 EA		\$65,010.59	\$0	\$130,021
Marketability	55,922 SF		46,000 SF		\$6.88	\$384,732	\$316,469
Total Office	27,961 SF		23,000 SF			\$991,026	\$881,179
Total R&D	27,961 SF		23,000 SF			\$991,026	\$881,179
Total Manufacturing							

Distribution

Chief of Engineers 20314-1000

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